

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Wireless Telecommunications Bureau)	WT Docket No. 02-86
Seeks Comment on Petition Filed by)	
AirCell, Inc. For Extension of Waiver)	

To: The Wireless Telecommunications Bureau

REPLY COMMENTS OF AIRCELL, INC.

Michele C. Farquhar
Angela E. Giancarlo
David L. Martin
HOGAN & HARTSON, L.L.P.
555 Thirteenth Street, N.W.
Washington, D.C. 20004-1109
Tel: 202-637-5600
Fax: 202-637-5910

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SUMMARY

As set forth in AirCell's March 28, 2003 Petition For Extension of Waiver ("Petition"), and its April 10, 2003 Comments in support of the Petition, AirCell has fully justified its request for extension of the period and scope of its current waiver of the airborne cellular rule. AirCell's request satisfies the Commission's waiver standards, and the Commission should disregard the unfounded and misleading arguments to the contrary put forth by Opposing Carriers AT&T Wireless, Cingular and Verizon. Extension of the period and scope of the waiver will not thwart the underlying purpose of the airborne cellular rule, because that rule's purpose is to prevent harmful interference and AirCell has conclusively demonstrated that operation of its system does not cause harmful interference.

Moreover, grant of the Petition would serve the public interest by promoting public safety and homeland security, advancing competition in the air-ground marketplace, and expanding consumers' access to wireless telecommunications, and would be consistent with the Commission's policy objectives regarding efficient spectrum usage. Finally, the Commission's recent inquiry regarding air-ground telecommunications services questions the underlying premise and future applicability of the airborne cellular rule.

Contrary to Opposing Carriers' claims, the solid evidence in the massive record in this proceeding justifies grant of the Petition. While Opposing Carriers claim the Commission does not have the "kind of evidence" it needs for consideration of the Petition, this is nonsense. AirCell has shown that it requires an extended waiver, given the long lead times in the aviation industry and

customers' needs for settled expectations regarding the system's availability. Moreover, the expanded scope of the waiver is needed because of the severe technical and economic limitations imposed by the current waiver's channel limitations, which serve no purpose in light of the absence of any harmful interference.

Most importantly, Opposing Carriers present no viable evidence to refute AirCell's exhaustive showing that it will not cause harmful interference to either analog or digital terrestrial cellular service. Although Opposing Carriers submitted lengthy engineering reports based upon V-Comm's technical tests of the AirCell system, AirCell's attached Engineering Review completely undermines and refutes the credibility of this testing. AirCell demonstrates, among other things, that V-Comm's noise floor study is fundamentally flawed; V-Comm measured aircraft signals incorrectly; non-reproducible test data probably resulted from altered and/or inappropriate and atypical site configuration factors; and data resulting from fixed Dynamic Power Control tests are irrelevant. Specifically, the Engineering Review details that:

- V-Comm failed to follow the instructions for the Lucent measurement tool it used to measure the cell site operating noise floor. To prevent severely skewed results, the lowest "bins" of data, representing only thermal noise, should have been discarded prior to calculating the relevant co-channel interference.
- V-Comm conclusions relied upon multiple data errors, including using the median data point to establish the noise floor (and the corresponding operating point) and using a limited data set for the noise floor study.
- The Lucent PLM2 measurement tool used by V-Comm is not accurate. AirCell tests of Lucent radios indicated large variations (up to 12 dB) in reported receive signal levels for identical injected inputs.

- Multiple calibration errors (*e.g.*, using only one diversity path, using a single signal source, leaving the antenna connected, injecting the signal at the imprecise -50 dB coupler) further destroyed the credibility of the noise floor data.
- V-Comm's analysis is based on its own newly-coined term, "Interference Analysis Point" ("IAP"), which V-Comm declares – with virtually no explanation – to be -114 dBm. V-Comm does indicate that this value is based on the results of its Phase 1 and Phase 2 Tests, which AirCell has shown to be critically flawed. Despite its claim to the contrary, the use of the unexplained IAP and its -114 dBm threshold is very much in dispute. 1/
- V-Comm conducted tests – in apparent violation of the Commission's waiver conditions – with the DPC function disabled. As the Commission has recognized, this will never occur in actual system operation and is therefore irrelevant. Almost all of V-Comm's analysis is based on this meaningless DPC-off data.
- The "bow tie" pattern flight path is virtually impossible to fly as shown and was crafted such that 59% of the flight occurred outside of AirCell's designed service area, which was then still in the build-out process. The flight path also required exaggerated aircraft maneuverings near the victim sites that resulted in momentary higher power readings on the ground.
- Cingular refused to enable handoffs, permitting V-Comm to "drag" calls out and induce higher power readings.
- The Marlboro site appears to have been improperly manipulated, including changing the dynamic power control ("DPC") settings, disabling AirCell's monitoring unit, lowering one set of AirCell antennas into the trees, and inappropriately positioning the victim receive antennas; AirCell was also refused permission to have a Smart Antenna installed.
- Two aircraft antenna installations were not inspected by AirCell, and there is no way of knowing whether the installations were correct at the time of the tests.
- The site selected for V-Comm's Phase 2 test was atypical, and featured a noise environment that was 17 dB better than the average for the 18 sites in the noise floor study, and had a system operating point whereby 80% of TDMA customer calls were already impaired by terrestrial co-channel interference.

1/ See *Engineering Review* at 2.5-1.

In addition, the comments submitted by Lucent do not support the V-Comm testing, contain inaccuracies, and fail to address key issues. Moreover, AirCell has also conducted additional tests that reconfirm its 1997 testing and confirm (once again) that it will not cause harmful interference to either analog or digital terrestrial cellular systems.

The Petition presents the Commission with an opportunity to act favorably upon its recognition of the need for mobile phones in aircraft, to bring competitive choice to the air-ground communications market, *and* to bolster the nation's significant effort to protect its skies by providing another means for ensuring airline passenger health and safety. For these reasons, the Commission must grant the Petition to extend the period and scope of the waiver.

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Exhibit A: AirCell Cellular Licensee Partners as of June 9, 2003

Exhibit B: AirCell Engineering Review of V-Comm Reports

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REPLY COMMENTS OF AIRCELL, INC.

AirCell, Inc. ("AirCell"), by counsel, hereby submits its reply comments in response to the March 11, 2003 *Public Notice* released by the Wireless Telecommunications Bureau ("Bureau"). 2/ As the Rural Cellular Association states, "after more than four years of real-world operations pursuant to its waiver, the AirCell system is an unqualified success." 3/ Despite the vociferous and repetitious objections of the Opposing Carriers, 4/ AirCell, in conjunction with its cellular

2/ Wireless Telecommunications Bureau Seeks Comment on Petition Filed by AirCell, Inc. for Extension of Waiver, *Public Notice*, 18 FCC Rcd 3726 (2003) ("*Public Notice*").

3/ Comments of Rural Cellular Association ("RCA"), WT Docket No. 02-86 (filed Apr. 10, 2003) ("RCA Comments") at 1.

4/ The "Opposing Carriers" are AT&T Wireless Services, Inc. ("AWS"), Cingular Wireless LLC ("Cingular"), and Cellco Partnership d/b/a Verizon Wireless ("Verizon"). See Comments in Opposition to Petition for Extension of Waiver of Opposing Carriers, WT Docket No. 02-86 (filed Apr. 10, 2003) ("Opposing Carriers' Comments").

licensee partners, 5/ has resoundingly proven its ability to “offer affordable public safety-enhancing communication services to unserved and underserved aviation market segments, without a new allocation of spectrum and, significantly, without causing harmful interference to existing licensees[.]” 6/ pursuant to the AirCell waiver. 7/

AirCell sought extension of the period and scope of the waiver on March 28, 2002. 8/ The Petition was originally placed on public notice on April 23, 2002, 9/ but, the Commission later extended the duration of the waiver 10/ and, separately, the pleading cycle for consideration of the Petition. 11/

5/ Contrary to Opposing Carriers’ suggestion that “AirCell appears to be uncertain how many Partners it has[.]” Opposing Carriers’ Comments at 13, n.39, the Commission’s records reflect that AirCell has 25 cellular licensee partners, including CC Communications. See Comments at 9, Exhibit A. An updated listing of the cellular licensee partners is provided at Exhibit A; however, the list does not (and need not) highlight distinctions regarding the varied contractual relationships between AirCell and certain of the cellular licensee partners, and the varying operational stages of those parties.

6/ RCA Comments at 1-2.

7/ We acknowledge Opposing Carriers’ nod to simplicity in referring to the waivers received by AirCell and its cellular licensee partners as “the AirCell waiver.” See Opposing Carriers’ Comments at 2, n.3.

8/ See Petition for Extension of Waiver (filed Mar. 28, 2002) (“Petition”); Comments of AirCell, Inc., WT Docket No. 02-86 (filed Apr. 10, 2003) (“Comments”).

9/ Wireless Telecommunications Bureau Seeks Comment on Petition Filed by AirCell, Inc. for Extension of Waiver, *Public Notice*, DA 02-949 (WTB 2002).

10/ AirCell, Inc., Petition, Pursuant to Section 7 of the Act, for a Waiver of the Airborne Cellular Rule, or, in the Alternative, for a Declaratory Ruling, *Order*, DA 02-1028 (WTB 2002).

11/ *Public Notice*.

Despite the arguments presented by the Opposing Carriers, and as set forth below, AirCell has fully justified its request for extension of the period and scope of the waiver. AirCell also has demonstrated that it will not cause harmful interference with either analog or digital terrestrial cellular service. In fact, Opposing Carriers have presented *no* valid evidence to refute AirCell's comprehensive showing that it will not cause harmful interference to either analog or digital terrestrial cellular service. Instead, the false assumptions and testing errors in the engineering reports of V-Comm, the Opposing Carriers' technical consultant, render its data, as well as its conclusions, meaningless. New testing conducted by AirCell confirms that AirCell will not cause harmful interference to either analog or digital terrestrial cellular service, and reconfirms the results from AirCell's 1997 analog tests and the digital test results submitted with the Petition.

For these reasons, AirCell urges the Commission to expeditiously grant the Petition and permit AirCell and its cellular licensee partners to operate the AirCell system: (1) indefinitely or, in the alternative, for a period of ten years; (2) on 19 cellular channel pairs rather than the six pairs currently authorized; and (3) on frequencies used for digital terrestrial cellular operations in addition to those used for analog terrestrial service.

I. AIRCELL HAS JUSTIFIED ITS REQUEST FOR EXTENSION OF THE PERIOD AND SCOPE OF THE WAIVER

A. AirCell's Request Satisfies The Commission's Waiver Standards

AirCell's request for extension of the period and scope of the waiver satisfies the Commission's waiver standards. ^{12/} As set forth below, AirCell has demonstrated that extension of the period and scope of the waiver would not thwart the underlying purpose of the rule, and that grant of the extension would serve the public interest and would be consistent with the Commission's policy objectives. The Commission should disregard the Opposing Carriers' misleading and unfounded arguments to the contrary. Moreover, in view of AirCell's unique ability to operate without causing harmful interference, enforcement of the rule would be contrary to the public interest. Finally, the Commission's recent inquiry regarding air-ground telecommunications services suggests that the underlying premise for the airborne cellular rule may be in question, which could ultimately moot the need for the waiver.

1. Extension Of The Period And Scope Of The Waiver Will Not Thwart The Underlying Purpose Of The Airborne Cellular Rule

There is no basis for Opposing Carriers' claim that "AirCell and its Partners have not carried their burden of showing that the purpose of the rule 'would not be

^{12/} Pursuant to Section 1.925 of the Commission's rules, a waiver applicant must demonstrate either that "[t]he underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the requested waiver would be in the public interest; or" that "[i]n view of unique or unusual factual circumstances of the instant case, application of the rules(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative." 47 C.F.R. § 1.925(b)(3)(i)-(ii).

served or would be frustrated by application to the instant case[.]” ^{13/} The underlying purpose of Section 22.925 of the Commission’s rules is to prohibit the use of handheld cellular telephones in airborne aircraft. ^{14/} The rule was promulgated as a result of the Commission’s concern that such use “could cause serious interference to transmissions at other cell locations within the system and to cellular systems in adjacent markets.”^{15/} In this case, however, the underlying purpose of the rule – to avoid causing harmful interference with cellular systems – would not be served because AirCell has proven that its specially designed mobile units and ground equipment operate to allow users to access the existing networks of AirCell’s cellular licensee partners without causing harmful interference to terrestrial cellular operations, as the Commission has recognized on multiple occasions. ^{16/} Moreover, the D.C. Circuit affirmed the Commission’s determination,

^{13/} Opposing Carriers’ Comments at 10.

^{14/} See Amendment of Sections of Part 22 of the Commission’s Rules in the Matter of Airborne use of Cellular Telephones and the Use of Cell Enhancers in the Domestic Public Cellular Radio Service, *Report & Order*, 7 FCC Rcd 23 (1991) (“*Airborne Use R&O*”).

^{15/} *Id.* at ¶ 3.

^{16/} AirCell, Inc., Petition, Pursuant to Section 7 of the Act, For a Waiver of the Airborne Cellular Rule, Or, in the Alternative, for a Declaratory Ruling, *Order*, 14 FCC Rcd 806 (WTB 1998) (“*AirCell Bureau Order*”), reconsideration granted in part, denied in part, *Order on Reconsideration*, 14 FCC Rcd 19430 (WTB 1999) (“*AirCell Reconsideration Order*”), review denied, *Memorandum Opinion and Order*, 15 FCC Rcd 9622 (2000) (“*AirCell Commission Order*”) (together the “*AirCell Waiver Orders*”), review granted in part, denied in part, *AT&T Wireless Servs., Inc. v. FCC*, 270 F.3d 959, 968-69 (D.C. Cir. 2001) (“*AT&T Wireless Servs.*”), reh’g denied (Jan. 29, 2002); *Order on Remand*, 18 FCC Rcd 1926 (2003) (“*Order on Remand*”), review filed (D.C. Cir. Feb. 26, 2003).

with respect to the original waiver, that AirCell had satisfied the established criteria for a waiver on this basis, and rejected the Opposing Carriers' objections.^{17/} Furthermore, real-world operation under the waiver has not resulted in harmful interference to analog terrestrial cellular systems. ^{18/}

AirCell also has submitted substantial testing documentation showing that it will not cause harmful interference to digital cellular systems. ^{19/} As discussed in Section II.C., *infra*, AirCell has reconfirmed its earlier conclusions with new data obtained from test flights conducted in the Northeast and in Colorado in April and May 2003.

With respect to the term of the waiver, as set forth in the Petition, the purpose of the initial waiver's two-year limit was to protect against what the Commission called "substantial uncertainties" of AirCell's novel technology. ^{20/} At this stage, however, any "uncertainty" has been dispelled through the "reasonable period of actual operation" contemplated by the limitation. ^{21/} Thus, Opposing

^{17/} *AT&T Wireless Servs.* at 961-62. Opposing Carriers attempt to reargue conclusions reached by the Commission (pursuant to the *AirCell Commission Order*) and the D.C. Circuit (pursuant to *AT&T Wireless Servs.*), *e.g.*, Opposing Carriers' Comments at 3-4, 6, 12, is inapposite and outside the scope of the Petition. As discussed in Section II.F., *infra*, opposing carriers have chosen to challenge the Remand Order in court; thus, repetition of these arguments in the instant proceeding is improper.

^{18/} See Comments at 14-15, 20; Petition at 19-20.

^{19/} Petition at 21-35; *see also infra* at Section II.C.

^{20/} Petition at 19, citing *AirCell Commission Order*, 15 FCC Rcd at 9646, ¶ 46.

^{21/} *AirCell Commission Order*, 15 FCC Rcd at 9646, ¶ 46.

Carriers' argument that Commission precedent requires the agency to limit the term of any renewal to two years must fail.

Finally, grant of the waiver as requested would not impact, let alone diminish, the Commission's important effort to enforce the prohibitions against harmful interference. Indeed, the Commission has had the authority to investigate and enforce complaints of interference since it was established in 1934, and it exercises this authority on a regular basis. 22/ Moreover, as part of the AirCell waiver, the Commission has created an open process for detecting and investigating alleged harmful interference events potentially caused by the AirCell system by establishing an express duty to provide information relating to any complaint of interference. 23/ In this regard, the Commission required AirCell to establish a process for detecting and reporting instances of harmful interference. 24/ Review

22/ See, e.g., *Lightning Electronics, Inc., Forfeiture Order*, 17 FCC Rcd 19136 (2002); *New Image Electronics, Forfeiture Order*, 17 FCC Rcd 3594 (2002).

23/ *AirCell Commission Order*, 15 FCC Rcd at 9651 (Condition 3).

24/ See Comments at 15, n.24. In spite of this established process, which none of the Opposing Carriers (or anyone else) has engaged, the Opposing Carriers complain that the procedure "relied on by the Commission to address interference issues is completely unworkable." Opposing Carriers' Comments at 16. Opposing Carriers do not stop there, however; they go on to claim that "AirCell interference to terrestrial operations would essentially be impossible to identify and trace to AirCell even if seriously harmful interference occurred often" *Id.* at 17. Similarly, Opposing Carriers assert that the "first real review of AirCell's interference based on substantial operation must be now, not ten years from now[.]" *Id.* at 19 (footnote omitted), and that the "time to consider the interference issues closely is before AirCell phones are ubiquitous." *Id.* at 18. These pleas have a "Chicken Little" quality – Opposing Carriers continue to make these charges even though they have been fully addressed on numerous occasions, and AirCell has already shown that it *is* possible to detect such potential interference if it exists.

and consideration of interference issues with respect to the impact of the AirCell system on analog cellular terrestrial systems has been underway for almost five years now and has not resulted in a single complaint of harmful interference to terrestrial cellular operations. ^{25/} With respect to the system's impact on digital terrestrial cellular operations, as discussed in Section II.C., *infra*, AirCell affirms its prior conclusions with new data obtained from test flights conducted in the Northeast and in Colorado in April and May 2003.

At this stage, there is no interference issue to “consider closely” – the Commission has more than “enough operational experience to judge the technical characteristics of this system”^{26/} and there is nothing in the Petition, the Comments, or the record as a whole that should give the Commission pause. The AirCell system does not cause harmful interference to analog or digital terrestrial cellular systems.

2. Grant Of The Petition Would Serve The Public Interest And Would Be Consistent With The Commission's Policy Objectives

Enforcing the ban on airborne cellular use in this instance would frustrate the public interest benefits of the AirCell system, including promoting the nation's public safety and homeland security goals, advancing spectrum efficiency, increasing competition in the air-ground marketplace, and expanding opportunities for consumer access to telecommunications while airborne. Opposing Carriers

^{25/} Comments at 14-15; Petition at 17-20.

^{26/} Opposing Carriers' Comments at 11, citing the *AirCell Commission Order*.

grudgingly concede that the Petition is replete with examples of how AirCell is using the AirCell system to serve the public interest; 27/ yet they also suggest that these uses of the AirCell System do not fit within the rubric of the Commission's waiver rule. 28/ Opposing Carriers are simply wrong. The demonstrated public interest benefits of the AirCell system amply justify the requested extension of the period and scope of the AirCell waiver. 29/

In 2001, the D.C. Circuit determined that "[t]he Commission's conclusion that the waiver will offer significant public safety benefits is thus amply supported by the record." 30/ Since that time and as set forth in the Petition and the Comments, 31/ the AirCell waiver has continued to advance the public interest.

27/ Opposing Carriers' Comments at 12, n.34.

28/ "No showing is made that ...application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest." Opposing Carriers' Comments at 10-11.

29/ An applicant for a waiver need only prove one of the two options for satisfying the Commission's waiver criteria. See 47 C.F.R. § 1.925(b)(3)(i)-(ii). In this instance, AirCell has also demonstrated that it separately meets the second option: In view of AirCell's unique ability to operate without causing harmful interference, enforcement of the airborne cellular rule would be contrary to the public interest. Specifically, AirCell has provided examples of how the AirCell system serves the public interest in myriad ways and has proven the existence of exceptional circumstances, given the company's demonstrated ability to expand operations without causing harmful interference to terrestrial cellular service, whether analog (as evidenced by almost five years of practical operations), Comments at 15-16; Petition at 17-20, or digital (as demonstrated by the testing set forth in the Petition), Petition at 21-36, and discussed further in Section II.C., *infra*. Indeed, given the context, strict application of the airborne cellular rule in this instance is not warranted.

30/ *AT&T Wireless Servs.*, 270 F.3d at 966.

31/ Petition at 10-16; Comments at 11-16.

Further, in their respective comments, the RCA 32/ and Rural Cellular Corporation 33/ also highlight AirCell's important public safety benefits.

The Commission long ago realized the "legitimate need" 34/ for mobile phones in aircraft, and AirCell was able to acknowledge and fulfill this communications need. Now, the Commission (and the country as a whole) has witnessed the exponential growth of the commercial wireless industry (and the corresponding overwhelming demand for "anytime anywhere" communications), the unfulfilled promise of a competitive air-ground communications marketplace, and the horrible events of September 11th, in which air-ground communications played a particularly poignant role. As discussed below, the Commission itself now questions whether it should continue to prohibit the use of cellular phones on aircraft. Thus, the Petition presents the Commission with a perfect opportunity to act favorably upon its longstanding recognition of the need for mobile phones in aircraft, to bring competitive choice to the air-ground communications market, *and* to bolster the

32/ RCA Comments at 2-3 (AirCell makes a significant contribution to aviation safety, is poised to provide important capabilities to enhance aircraft security, and permits rural cellular licensees to play a direct role in contributing to public safety and homeland security efforts – "an ability not even contemplated prior to the advent of the AirCell system[]").

33/ Comments on Petition for Extension of Waiver submitted by Rural Cellular Corp. ("RCC"), WT Docket No. 02-86 (filed Apr. 10, 2003) ("RCC Comments") at 2 ("[a]ccess to real-time data on weather, navigation, moving maps, telemetry and 911 service greatly enhance the safety of air traffic, and the security benefits cannot be overstated[] ... [t]he proposed deployment of cockpit and cabin video surveillance and crew-to-ground communications stand to make flying a far safer mode of travel[]").

34/ *Airborne Use R&O*, 7 FCC Rcd 24, ¶ 11.

nation's significant effort to provide another means for passenger health and airline safety. Furthermore, the new developments since the Petition was filed – increased demand for the AirCell system, steady interest from both the federal government and commercial airlines, and the provision of an immediate direct link from the air to the ground in emergency situations (with MedAire, Inc.) – provide additional confirmation of the need to grant the Petition.

As discussed above, the requested extension would not impact, let alone diminish, the Commission's efforts to enforce the prohibitions against harmful interference. Moreover, as discussed below, extension of the waiver would be consistent with the Commission's current policy evolution toward greater reliance on the marketplace to expand the scope of available wireless services and devices, as well as its efforts to make the air-ground communications marketplace more efficient and competitive.

As noted in the Comments, the AirCell system is consistent with the policy direction set forth in the Commission's Spectrum Policy Task Force Report. ^{35/} First, the AirCell system is a perfect example of a technological innovation that provides for the more efficient use of spectrum, but that requires a waiver of the Commission's rules to permit recognition of the efficiencies. Second, by expanding

^{35/} Comments at 19-20, citing November 2002 Spectrum Policy Task Force Report. Since the Comments were filed, President Bush signed an Executive Memorandum creating the "Spectrum Policy Initiative" to develop recommendations for improving spectrum management policies and procedures. Fact Sheet on Spectrum Management, *White House News Release* (June 5, 2003). Among other things, the President is seeking recommendations to "facilitate policy changes to create incentives to increase the efficiency and beneficial use of spectrum ..." *Id.* at 2.

the waiver, the Commission will allow AirCell to continue to re-use rural spectrum made available by rural carriers, and to provide rural carriers with an additional revenue stream. ^{36/} Such additional revenue allows participating carriers to “improve their traditional, terrestrial service offerings to rural consumers, another Commission goal.” ^{37/}

The AirCell system is also consistent with the Commission’s recently adopted order to create a secondary spectrum marketplace. ^{38/} According to the Commission’s news release, its recent ruling “will allow and encourage licensees to freely lease their unused or unneeded spectrum capacity, which will increase the amount of spectrum available to prospective users and new wireless technologies.” ^{39/} Of course, the AirCell waiver has permitted AirCell and its cellular licensee partners to utilize a similar approach through resale of the spectrum for some time now, perhaps helping to pave the way for the Commission’s new leasing rules.

^{36/} RCA Comments at 4.

^{37/} *Id.*

^{38/} FCC Adopts Spectrum Leasing Rules and Streamlined Processing for License Transfer and Assignment Applications, and Proposes Further Steps to Increase Access to Spectrum Through Secondary Markets, FCC News (rel. May 15, 2003) (“*Secondary Markets News Release*”).

^{39/} *Id.*

As the Commission has acknowledged, AirCell also plays a role in the agency's effort to stimulate competition in the air-ground marketplace. ^{40/} As a result of its conclusion that "existing rules and regulations regarding the use of the commercial air-ground spectrum – as well as rules governing the use of other wireless services for such transmissions – may be impeding the efficient, competitive provision of services to the public," ^{41/} the Commission has undertaken a "reexamination" of its rules governing the provision of air-ground telecommunications services on commercial airplanes "in order to enhance the options available to the public." ^{42/} Indeed, as part of its reexamination, the Commission has expressly stated: "Nothing in AirCell's current waiver prohibits operation on commercial, as opposed to general, aviation aircraft." ^{43/} Just as important, and as discussed in Section I.A.3. *infra*, the Commission has also questioned whether it should repeal or modify Section 22.925 of its rules in light of the air-ground marketplace.

We also note that AirCell has satisfied its burden under the waiver standard by showing, both analytically as well as through comprehensive testing, that

^{40/} Amendment of Part 22 of the Commission's Rules To Benefit the Consumers of Air-Ground Telecommunications Services, Biennial Regulatory Review - Amendment of Parts 1, 22, and 90 of the Commission's Rules, *Notice of Proposed Rulemaking*, ____ FCC Rcd ____, FCC 03-95, WT Docket No. 03-103 (rel. Apr. 28, 2003)(*"Air-Ground Service NPRM"*).

^{41/} *Id.* at ¶ 3.

^{42/} *Id.* at ¶ 1.

^{43/} *Id.* at ¶ 14, n.49.

operation on the digital channels will not cause harmful interference. By contrast, as opponents of the innovative new service that AirCell proposes to continue and expand, the Opposing Carriers have not satisfied their burden, pursuant to Section 7 of the Act, 44/ to demonstrate that AirCell's proposal is not in the public interest. The Commission has previously recognized the burden that Section 7 places on opponents of waivers related to the provision of new technologies and services. 45/ In addition to this presumptive public interest benefit, Section 7 explicitly protects developers of new technologies and services, such as AirCell, from cumbersome and drawn-out regulatory proceedings. 46/

3. The Commission's Recent Inquiry Regarding Air-Ground Communications Questions The Underlying Premise And Future Applicability Of The Airborne Cellular Rule

As set forth in the *Air-Ground Service NPRM*, the Commission has expressly sought comment on whether to repeal or modify Section 22.925 of its rules. 47/ In

44/ 47 U.S.C. § 157.

45/ See Implementation of Section 304 of the Telecommunications Act of 1996, *Notice of Proposed Rulemaking*, 12 FCC Rcd 5639, 5662 (1997) (citing Section 7's requirement that those who oppose "a new technology or service proposed . . . shall have the burden to demonstrate that such proposal is inconsistent with the public interest").

46/ See 47 U.S.C. § 157. The Senate committee that drafted Section 7 (as part of the 1984 Cable Act) stated, "It is not intended that these subsections create any new petition or application procedure, but only that such petitions or applications as may be filed ... pursuant to other sections of the act be ruled upon expeditiously, in order that the public not be deprived of new services through administrative delay." Cable Communications Policy Act of 1984, Pub. L. No. 98-549, S. Rep. No. 67, 98th Cong., 1st Sess. 32 (Apr. 27, 1983).

47/ *Air-Ground Service NPRM* at ¶ 22 ("[s]hould we repeal or modify our prohibition against the use of cellular equipment while airborne?").

this regard, the Commission has acknowledged that “[t]here clearly are significant technological developments that may facilitate the use of such equipment on airborne aircraft without causing interference to terrestrial operations or posing aeronautical risks, as well as heightened interest from the airline industry in permitting such use.” 48/ The Commission describes how airplane passengers could rely on their own personal handsets “to send and receive data or voice communications, at low power, to a special transceiver” located on the airplane. 49/ Although the Commission notes that the Federal Aviation Administration (“FAA”) “may continue to define” such use, it also states that such FAA oversight would result from “concerns about possible interference to the aircraft’s own systems[,]” 50/ rather than from concerns about possible harmful interference to cellular terrestrial systems, or to broadband personal communications services (“PCS”) phones, for that matter. 51/

The Commission’s question regarding Section 22.925 of its rules, together with its recognition of the significant technological developments since the rule was

48/ *Id.*

49/ *Id.*

50/ *Id.*

51/ “There is no comparable rule governing use of PCS phones on airborne aircraft.” *Id.* at ¶ 11. Moreover, Part 90 land mobile operations, which include Specialized Mobile Radio, are permitted aboard aircraft so long as: (1) the aircraft is regularly flown at altitudes of less than 1.6 km above the earth’s surface; (2) the transmitter output power does not exceed ten watts; (3) the operations are secondary to land-based systems; and (4) any other steps necessary to minimize interference to land-based systems are implemented. *Id.* at n.29, citing 47 C.F.R. § 90.423(a).

promulgated and the fact that there is no such rule for PCS phones, suggest that the underlying premise for the rule may be in doubt. Needless to say, a repeal of the rule would moot AirCell's need for a waiver. In the interim, however, AirCell submits that the Commission's reexamination of its historical concern lends additional support for grant of the Petition.

B. Contrary To Opponents' Claims, The Solid Evidence In The Massive Record In This Proceeding Justifies Grant Of The AirCell Request

Opposing Carriers would have the Commission believe that it does not have the "kind of evidence" it needs for consideration of the Petition. 52/ This is nonsense. The Opposing Carriers place undue emphasis on the *optional* reports 53/ filed by AirCell's cellular licensee partners by asserting that the Commission does not have "the required information upon which to make a judgment[]" 54/ and that the Commission should take the unprecedented step of rejecting "as completely baseless" the waiver requests of those AirCell partners that have not submitted these optional reports. 55/ The Opposing Carriers overlook the obvious -- all of the cellular licensee partners joined the Petition, including the technical exhibits and

52/ Opposing Carriers' Comments at 11.

53/ "Special Condition 9 ... *allows* cellular licensees ... to submit a comprehensive report to assist the Commission ..." (emphasis added). *AirCell Commission Order*, 15 FCC Rcd at 9645, ¶ 45; "[C]ellular licensees *may* each submit a comprehensive report ..." *Id.* at 9652, Special Condition 9 (emphasis added).

54/ Opposing Carriers' Comments at 12.

55/ *Id.* at 15.

studies appended thereto. 56/ In so doing, the cellular licensee partners have already fully endorsed and expressed their support for AirCell's request for extension of the period and scope of the waiver. Certainly any partners that disagreed with the AirCell request either would not have joined the Petition, would have made a filing in opposition to the Petition, or both. 57/

Contrary to the Opposing Carriers' misleading arguments, in truth, each of the AirCell partner reports provides information that is relevant to the Commission's analysis. 58/

56/ Opposing Carriers suggest that Western Wireless does not join in AirCell's finding that its airborne cellular operations will not cause harmful interference to digital or analog terrestrial cellular operations. *Id.* at 22. Here again, Opposing Carriers overstate the facts. As forthrightly disclaimed in the Petition, in consideration of practical business realities, Western Wireless did not join Section III.B.2. of the Petition, which discusses AirCell's digital testing. *See* Petition at 22, n.49. Western Wireless signed the Petition, however, and joined the pleading in all other respects. Further, Western Wireless did not elect to oppose the Petition and has never notified AirCell, the Commission, or anyone else of any harmful interference related to the AirCell system. *See infra* at 19. Moreover, as discussed below, Western Wireless also filed a one-year report discussing the company's satisfaction with AirCell.

57/ Opposing Carriers also assert that the reports do not present data related to quality of service or customer satisfaction. Opposing Carriers' Comments at 14. For purposes of clarification, we note that AirCell's cellular licensee partners cannot comment on the satisfaction of AirCell's customers, just as, for example, AT&T Wireless could not comment on the satisfaction of Verizon's customers. AirCell's cellular licensee partners have no interface with AirCell's customers. *Cf. infra* at 18, Western Wireless's report that it has not received any complaints from its own customers regarding interference.

58/ Opposing Carriers note that the Commission has not made the reports available for review in its AirCell file. Opposing Carriers' Comments at 13, n.35. AirCell is hopeful that the Commission will redouble its efforts in this regard. The Opposing Carriers, as well as the general public, should have easy access to all reports related to the AirCell waiver.

- United States Cellular Corporation (“USCC”) reports that AirCell is utilizing spectrum in 37 markets, located primarily in rural areas, and that “USCC has neither recorded any incidents of interference owing to AirCell transmissions nor have such incidents been reported to USCC by neighboring carriers.” 59/
- CELLCOM reports that AirCell is utilizing spectrum in only two cellsites, yet the company “is earning revenue at sites that it otherwise would not see ...” and is “pleased with its relationship with AirCell and believes that continuation of this service is in the public interest.” 60/
- Centennial Communications (“CENTENNIAL”), which is providing network capacity to AirCell through seven cell sites located in three states, reports it is “earning revenue from an otherwise unserved market[,]” 61/ and that “[a]viation users are now able to get a low cost communications link into their aircraft that can be used to make otherwise unproductive time more productive.” 62/
- Western Wireless, which is providing capacity at 23 cellular sites located in 10 states, 63/ reports that it “has detected no harmful interference or performance problems. Furthermore, Western Wireless has received no interference complaints from its customers or neighboring cellular providers, nor have there been any harmful interference incidents related to these operations. Western Wireless’s customers remain satisfied with their high quality of terrestrial mobile services ...” 64/

59/ Letter from Peter M. Connally, counsel to USCC, to M. Salas, Secretary, FCC (dated June 14, 2001) at 3.

60/ Letter from James Lienau, Vice President of Corporate Technical Services, NEW-CELL, INC., dba CELLCOM, to M. Salas, Secretary, FCC (dated June 11, 2001) at 1.

61/ Letter from David Carter, Director, RF Engineering, Centennial Communications, to M. Salas, Secretary, FCC (dated June 24, 2001) at 1.

62/ *Id.*

63/ Letter from Gene DeJordy, Vice President, Regulatory Affairs, Western Wireless Corp., to M. Salas, Secretary, FCC (dated July 5, 2001) at 1.

64/ *Id.* at 2.

Finally, Opposing Carriers suggest that the fact that only four of AirCell's cellular licensee partners filed these optional reports reflects that "nearly all [of the partners] made no claim of interference-free operations." 65/ Opposing Carriers disregard the fact that, in light of the express and ongoing obligation of the cellular licensee partners to report any instances of harmful interference pursuant to the *AirCell Commission Order*, AirCell properly concludes that a lack of such reports signifies that there has been no interference. 66/ Moreover, as noted above, any cellular licensee partners that have experienced interference surely would not have supported the Petition, including its very specific findings in this regard. Finally, the reports indicate that these carriers collectively provide AirCell access to 69 cell sites, which is more than half of the 135 cell sites that AirCell utilizes even now. This analysis demonstrates that AirCell has reasonably concluded that its partners have experienced interference-free operations.

C. The AirCell Request Merits Extensions Of Both The Period And The Scope Of The Waiver

AirCell has provided a solid rationale for extending the period of the waiver and has compellingly demonstrated that an extension of the scope of the waiver is necessary. Yet Opposing Carriers assert that the Commission must "provide for a full review after a new, limited term, real-world evaluation period based on

65/ Opposing Carriers' Comments at 13.

66/ AirCell is, in fact, designated as the single point of contact for any reports of interference pursuant to Special Condition 2 of the *AirCell Commission Order*. AirCell has received no such reports.

operational experience before it considers anything like a ten-year term.” 67/

AirCell submits that the Commission need exercise nothing more than its usual due diligence at this stage because AirCell does not seek the revolutionary changes that the Opposing Carriers’ dramatic arguments suggest. In fact, as set forth below, AirCell seeks nothing more than to allow its business to progress to the next logical step in the air-ground communications marketplace, to mirror the Commission’s own progression on this issue.

1. AirCell Has Provided A Solid Rationale For Extending The Period Of The Waiver

Opposing Carriers describe AirCell’s request for a ten-year or unlimited length waiver as “baseless” policy arguments that are unrelated to the length of the waiver. 68/ In fact, AirCell has submitted a logical, well-reasoned request that merits Commission approval.

First, grant of an extended waiver term will benefit the aviation industry. The product cycles of the aviation industry are much longer than those of most commercial products. In fact, product life cycles of seven to ten years are considered short in the aviation field. A longer waiver term would allow AirCell’s aviation customers to better plan the future service offerings for their in-flight passengers simultaneously with their design and roll out of new aircraft.

By extending the period of the waiver, the Commission will allow AirCell to avoid the substantial expense, long delays and uncertainty occasioned by the

67/ Opposing Carriers’ Comments at 19, n.55.

68/ Opposing Carriers’ Comments at 17.

extensive litigation in order to focus entirely on the needs of its customers. As the Commission has recognized in extending the length of private radio license terms from five to ten years, the public interest is not served by expenditure of funds on a regulatory process that could be made less burdensome. 69/ Indeed, this process has produced a financial overhang that makes it difficult for AirCell to make infrastructure investments and service upgrades. A strong and economically viable AirCell would preserve competition within the air-ground marketplace as well as AirCell's alternative technological means of providing this important service. 70/ In addition, rural cellular operators will "continue to have the opportunity to benefit from working with AirCell in a manner that generates revenue while making efficient use of spectrum and base station capacity." 71/ For these reasons, the Commission should relieve AirCell of this constraint by extending the period of the waiver.

In addition, grant of an extension would conserve the Commission's *own* limited resources, and the Commission has granted other extensions on this basis. 72/ An extended waiver term for AirCell would similarly alleviate the burden

69/ 1998 Biennial Regulatory Review – 47 C.F.R. Part 90 – Private Land Mobile Radio Services, *Report & Order*, 15 FCC Rcd 16673, 16677-78, ¶¶ 9-10 (2000).

70/ See *supra* at 13, discussion of *Air-Ground Service NPRM*; see also RCA Comments at 3 ("the waiver of Section 22.925 promotes intermodal competition by permitting cellular licensees to provide service, through AirCell, in direct competition with the air-ground licensees[]").

71/ RCC Comments at 2.

72/ See Texas Grace Communications; Request to Toll the Period to Construct Unbuilt Station KRZB(FM), Archer City, Texas, *Memorandum Opinion & Order*, 16

on the Commission. As noted in the Comments, the myriad filings submitted by Opposing Carriers burden the Commission's limited resources with their ongoing claims that the voluminous record in this proceeding is somehow inadequate. ^{73/} In this instance, the Commission has clearly defined the rules that govern AirCell and its cellular licensee partners, set parameters in connection with the rules, and has resisted imposing the severe, heavy-handed regulatory approach advocated by the Opposing Carriers. This has enabled AirCell to successfully introduce an innovative new service to an important sector of the aviation industry, and granting the extension will enable AirCell to continue and expand this service.

As if a radical or otherwise objectionable concept, Opposing Carriers state that AirCell's "primary basis for an extended term [is for] "business reasons ... to make it easier for AirCell to sign up customers and sell units." ^{74/} Would Opposing Carriers suggest that they are not in business to sign up customers and sell units? Indeed, in making this argument, Opposing Carriers fail to acknowledge that the Commission has acted in recognition of practical business realities on numerous

FCC Rcd 19167, 19171 ¶ 9 (2001) (decision "doubling the construction period for a new radio station reflected a specific balancing of [the Commission's] interest in expeditious construction and avoiding waste of Commission and applicant resources on an endless variety of requests to extend the authorized construction period[]").

^{73/} Opposing Carriers' Comments at 22. Indeed, as originally predicted by AirCell, it has spent an inordinate amount of resources defending the waiver and, now, persuading the Commission to renew and extend the waiver. *See AirCell Commission Order*, 15 FCC Rcd at 9645-46, ¶ 45.

^{74/} Opposing Carriers' Comments at 18.

occasions by issuing waivers and introducing flexible approaches. 75/ Furthermore, they too have sought Commission relief in light of their own business issues and costs. 76/

Finally, “[t]he Commission has long recognized that economic realities are often a component of waiver requests.” 77/ In addition, the Commission has

75/ See, e.g., *Secondary Markets News Release* at 2 (stating that the Commission will introduce a “refined *de facto* standard” because the previous standard “has become increasingly out of step with the flexible, market-based spectrum policies that Congress and the Commission have developed in recent years[]”); BIZTEL, INC., *Memorandum Opinion & Order*, 18 FCC Rcd 3308, 3310 ¶ 6 (2003)(even though the licensee acknowledged that its facilities had been established and dismantled periodically throughout its license term, the Commission recognized the provision of substantial service because “the provision of wireless local loop service changes constantly to accommodate the unique and varying demands of customers[]”); *Disposition of Down Payment and Pending Applications By Certain Winning Bidders in Auction No. 35, Requests for Refunds of Down Payments Made in Auction No. 35, Order & Order on Reconsideration*, 17 FCC Rcd 23354, 23360 ¶ 10 (2002) (although the Commission found that it had no legal obligation to provide relief to Auction No. 35 winning bidders, it ruled that “such relief in this particular instance and at this time is within our discretion and is consistent with our obligations to balance various public interest considerations under [the Act]”).

76/ See, e.g., Verizon Wireless’s Petition for Partial Forbearance from the Commercial Mobile Radio Services Number Portability Obligation and Telephone Number Portability, *Memorandum Opinion & Order*, 17 FCC Rcd 14972, 14976 n.35, 14984 (July 16, 2002), affirmed, *Cellular Telecommunications & Internet Ass’n v. FCC*, No. 02-1264 (D.C. Cir. June 6, 2003); Reply Comments of the Cellular Telecommunications & Internet Association, WT Docket No. 01-184 (filed Oct. 22, 2001) at 15 (internal citations omitted) (“[the] estimate of the costs of LNP implementation for the wireless industry approaches \$1 billion ...no single issue will cost wireless carriers more in terms of labor and dollars as number portability[]”); Cingular Wireless LLC, Petition for Limited Waiver of Sections 20.18(e)-(h), CC Docket No. 94-102 (filed July 6, 2001) at 28-30 (“waiver will permit Cingular to deploy Phase II solution for its TDMA network more quickly than and at a fraction of the cost of the other ‘solutions[]’”).

77/ Clearview Cable TV, Inc., Application for Waiver of Section 76.501(d) of the Commission’s Rules, *Memorandum Opinion & Order*, 9 FCC Rcd 6144, 6147 ¶ 23 (CSB 1994).

determined that “prohibitive cost factors are an important element to be weighed in determining where the public interest lies.” 78/ As discussed in the Comments, the litigious nature of this proceeding alone evidences the significant economics associated with the waiver. 79/ The RCA notes that the two-year term places “financial and administrative burdens on all interested parties[,]” and that “[s]maller rural carriers are the least equipped with the resources needed to participate in such frequently recurring proceedings.” 80/ The RCA adds that a longer waiver term “would also provide the stability needed for RCA AirCell Partners, as the underlying service providers, to make better business, financial and operational planning decisions.” 81/

2. AirCell Has Demonstrated That Extension Of The Scope Of The Waiver Is Necessary

As set forth below, AirCell has shown that extension of the scope of the waiver is necessary. Moreover, AirCell’s ongoing comprehensive monitoring ensures its continued compliance with the waiver and reflects its long-term commitment to serving the air-ground market.

Increase in the number of channels. Opposing Carriers heavily criticize the “minimum usage” of the AirCell System, yet they also assert that the Commission

78/ Teleprompter Corp., *Memorandum Opinion & Order*, 91 FCC 2d. 146, 164 (1982).

79/ Comments at 22.

80/ RCA Comments at 4.

81/ *Id.*

should prevent AirCell from continuing and expanding its service and thus should not grant an increase in the number of channels per site available to AirCell. 82/ Opposing Carriers' myriad claims that AirCell has not justified its request for increased channels 83/ are at best a smokescreen that attempts to completely hide the threshold finding that is most relevant to this aspect of AirCell's request: Because AirCell does not cause harmful interference, there is no need to limit the number of channels it should be permitted to use. If AirCell does not cause harmful interference on one channel pair, four channel pairs, or six channel pairs (pursuant to the current waiver), it will not cause harmful interference on nineteen channel pairs. 84/ Moreover, there is no evidence that neighboring cellular carriers are restricting in any way their use of the channels that are also used by AirCell. Thus, the Opposing Carriers can show no real-world harm from AirCell's request. 85/

82/ Opposing Carriers argue that the lack of interference complaints cannot justify waiver renewal, given the minimum usage of the AirCell system. "[T]here has been almost no usage of AirCell's system, and consequently there has been little opportunity for generating interference complaints." Opposing Carriers' Comments at 15.

83/ *Id.* at 20-21.

84/ As a practical matter, we note that there are a total of 392 to 399 channel pairs at any given cell site. Thus, AirCell's request to use 19 channel pairs out of this total is very modest.

85/ It is also significant that the Commission has consistently "emphasized the importance of AirCell's secondary status and advance notification to nonparticipating carriers so that they can steer AirCell away from use of particular channels. As the Commission has explained, with the grant of the waivers nothing has changed insofar as the protections to which existing licensees are entitled." *AT&T Wireless Servs.*, 270 F.3d at 964. AirCell fully expects these conditions to stay in place despite the increased number of channels. Of course, should the Commission grant its request to use digital channels, AirCell would no longer need

Indeed, Opposing Carriers attempt to bolster their unfounded allegations by claiming that “[n]ineteen channels per ground station would give AirCell enough capacity to handle more than seven times its 2003 demand projection.” 86/

Opposing Carriers have missed the point. AirCell has requested an increased capacity of 19 channel pairs in order to address its *future* needs (and those of its customers), not for the company’s needs in 2003. 87/ In fact, AirCell has demonstrated that the need for additional channel capacity becomes more and more critical as the demand for AirCell service grows and the company explores expanded and new applications. Further, the current channel limitation imposes a very significant economic limitation, as well as a technical one. By opposing AirCell’s ability to increase the number of channels used at existing sites, Opposing Carriers are effectively asking the Commission to keep AirCell’s expansion costs high. 88/

to provide advanced notice of the use of digital channels (to meet its obligation under the digital exclusion). Under this scenario, however, AirCell would continue to provide advanced notice of the channels it would be using, whether digital or analog. AirCell will continue to meet all technical requirements currently in place under the waiver. The company will continue to operate on secondary status, mindful of its obligation to react immediately to any instances of harmful interference. Furthermore, the Commission will continue to have the necessary tools to monitor the AirCell system.

86/ Opposing Carriers’ Comments at 21 (emphasis omitted).

87/ Opposing Carriers are also relying on outdated demand projections. Like many companies, AirCell treats its projected growth rate information as business confidential data.

88/ Opposing Carriers’ fail to acknowledge that AirCell is currently not limited in the total number of channels it may use; it is only limited in the number of channels *per site*. AirCell could add additional channels today by building new sites.

Opposing Carriers similarly claim that the amount of traffic on AirCell's existing network of stations can be adequately accommodated within the current arrangement and suggest that AirCell must provide projections of Erlangs of traffic. 89/ In reality, there is no need for AirCell to project Erlangs of traffic, which will vary significantly site-by-site and is likely to be sensitive and confidential business information. The simple truth is that AirCell will use the additional channels if it has a need to use them, and the company will not use them if there is no need to do so, neither of which should be of any concern to the Opposing Carriers. The point is that AirCell must have the flexibility to address the dynamics of the market, as well as the projected needs of its current and future customers, without having to make unnecessary, multiple showings before the Commission.

As explained in the Petition, the combined force of restrictions against using more than six cellular channel pairs per base station, and against operating on channels used by neighboring licensees for digital terrestrial cellular service, restricts AirCell's ability to provide its users the high-quality service they expect. 90/ Moreover, AirCell must be able to ensure any new customers of its ability to deliver upgraded services. In turn, its customers must be able to make

89/ Opposing Carriers' Comments at 20. Opposing Carriers attempt to bolster their argument by stating that "AirCell has more sites in operation now than it did when it filed the Petition was filed a year ago [*sic*], so its estimated 200 Erlangs of traffic should actually be distributed over more sites, reducing the average amount of traffic per site." *Id.* at 21, n.62.

90/ Petition at 41-43.

necessary investments confidently. 91/ As stated by RCC, AirCell “should be able to negotiate with potential cellular licensee partners, investors, vendors and customers with confidence in its ability to expand services. Making additional channel pairs available for use will benefit that effort.” 92/ Enabling AirCell to use as many as 19 channel pairs in each market is negligible, particularly given that the Opposing Carriers’ arguments are all based on faulty premises (as discussed in Section II, *infra*).

Use of digital channels. As is shown below, Opposing Carriers do not provide any credible findings to support their opposition to AirCell’s request that the Commission lift the digital restriction and permit the company to use digital channels. 93/ Indeed, the inaccuracies underlying V-Comm’s Phase 2 test render all of the Opposing Carriers’ claims meaningless. 94/ Furthermore, all of AirCell’s testing confirms that AirCell does not and will not cause harmful interference to digital terrestrial cellular systems.

Furthermore, as discussed in the Petition, as more cellular providers convert their terrestrial systems from analog to digital, it has already become increasingly difficult for AirCell to identify a set of analog channels to use at many sites. 95/

91/ See RCC Comments at 3.

92/ *Id.*

93/ See, e.g., Opposing Carriers’ Comments at 20-22.

94/ See *infra* at Sections II.A. and II.B.

95/ Petition at 41-43.

AirCell has already explained in its Comments that, since the time it filed its Petition, the Commission has ruled that cellular carriers may eliminate their analog channels within five years. 96/ Opposing Carriers fail to mention this key detail. Indeed, AT&T Wireless and Cingular supported the *immediate* elimination of the analog requirement. 97/ Needless to say, this impending transition – now less than five years away – brings a new urgency to AirCell’s request to expand the scope of the waiver. As stated by RCC, the “maturity of the cellular industry now justifies lifting the ban.” 98/

Service to commercial aircraft. The Opposing Carriers continue to protest AirCell’s efforts to expand its business operations into the commercial airline sector. 99/ As the Opposing Carriers correctly observe, the Commission has previously acknowledged AirCell’s plans to expand its service to commercial airline

96/ Year 2000 Biennial Regulatory Review – Amendment of Part 22 of the Commission’s Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and other Commercial Mobile Radio Services, *Report & Order*, 17 FCC Rcd 18401 (2002).

97/ See Reply Comments of AT&T Wireless Services, Inc., Year 2000 Biennial Regulatory Review – Amendment of Part 22 of the Commission’s Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and Other Commercial Mobile Radio Services, WT Docket No. 01-108 (filed Aug. 1, 2001) at 1-2, 6 (“the Commission should adopt the proposal of various commenters to eliminate immediately the unnecessary and discriminatory cellular analog requirement[]”); Reply Comments of Cingular Wireless LLC, Year 2000 Biennial Regulatory Review – Amendment of Part 22 of the Commission’s Rules to Modify or Eliminate Outdated Rules Affecting the Cellular Radiotelephone Service and Other Commercial Mobile Radio Services, WT Docket No. 01-108 (filed Aug. 1, 2001) at 2-3 (reiterating its position that the analog rule “should be removed immediately”).

98/ RCC Comments at 4.

99/ Opposing Carriers’ Comments at 19, n.55.

services and has not hindered AirCell's ability to do so in any way. 100/ Moreover, the D.C. Circuit correctly held that the carriers did not seek clarification of this issue on reconsideration. 101/ More recently and as noted above, the *Air-Ground Service NPRM* expressly states: "Nothing in AirCell's current waiver prohibits operation on commercial, as opposed to general aviation, aircraft." 102/ Perhaps this latest Commission statement on the matter will at last settle this issue.

As a result, AirCell will necessarily continue to operate under the waiver and its experimental license with responsibility and great care, while providing detailed information on its testing for the Commission, the Opposing Carriers, and any other party interested in its efforts. AirCell is proud of its record and has never concealed its attempts to grow its business, but rather has made its plans clear through the course of the proceeding. 103/ In fact, as discussed in the Comments, the air-ground marketplace is now served only by Verizon (formerly GTE) Airfone, which uses

100/ *Id.* at 8, 17, n.49. Opposing Carriers misleadingly state that AirCell claims the FCC staff "supports" its entry into the commercial aviation sector. *Id.* at 17, n.49. The Petition accurately quoted the *Biennial Review 2000* Staff Report as describing AirCell as "[a]nother potential source of competition in the air-ground sector" Petition at 15, n.30. In any event, as noted previously, the recently issued *Air-Ground Service NPRM* clarifies the Commission's position on this matter.

101/ *AT&T Wireless Servs.*, 270 F.3d 959, 966. We note that the Opposing Carriers also argued this point in their Petition for Rehearing, asking the court to "... include as part of the remand the issue whether the FCC meant to authorize service to commercial aircraft and, if so, on what record it based that decision." Petition for Rehearing submitted by Opposing Carriers, *AT&T Wireless Servs., Inc. v. FCC*, No. 00-1304 (D.C. Cir., filed Dec. 12, 2001) at 6. The court denied the petition on Jan. 29, 2002.

102/ *Air-Ground Service NPRM* at ¶ 15, n.49.

103/ *See, e.g.*, Comments at 11-14, 16; Petition at 13-16.

outdated technology, as a result of Claircom's withdrawal from the market. 104/
This reality, which the Commission has recognized as problematic, serves as an
additional reason to grant the Petition. 105/

Opposing Carriers cite to the V-Comm testing as finding "that AirCell usage
on high-altitude jet flights poses a serious threat of widespread harmful
interference to terrestrial cellular operations." 106/ The V-Comm testing is
completely exposed in Section II, *infra*, but there is also a practical response to this
flawed argument. Business jets, which AirCell currently serves, certainly fly as far,
as fast, and as high as commercial aircraft. Moreover, the propagation on a
business jet antenna is absolutely no different from that on a commercial aircraft.
Also, like commercial aircraft, business jets frequently carry a number of individual
business executives, each with his or her own business need to communicate with
persons on the ground, resulting in multiple communications occurring
simultaneously (and the resulting simultaneous use of multiple channels).

Similarly, the Opposing Carriers encourage the Commission to consider the
interference issues "before AirCell phones are ubiquitous," 107/ but they also
complain that AirCell provides "nothing but puffery concerning the demand for its

104/ Comments at 12.

105/ *Air-Ground Service NPRM* at ¶¶ 3, 12. *See also supra* at 13.

106/ Opposing Carriers' Comments at 19-20.

107/ Opposing Carriers' Comments at 18.

service.” ^{108/} By setting forth this paradox so clearly, the carriers make obvious their intention to completely extinguish *any* form of competition, no matter how nascent, in the current monopoly air-ground service marketplace.

AirCell’s ongoing comprehensive monitoring. As described in Section 2.6.b of the Engineering Review, AirCell has flown nearly one million miles of flight tests, and has collected thousands of hours of data. Moreover, AirCell tests every new cell site added to its network (as part of the cell site’s “turn-on” process), and regularly tests segments of its network to ensure correct operation. AirCell has developed a continual and ongoing flight test program, and has made significant investments in sophisticated data gathering and logging equipment and software to accurately measure signals to and from aircraft. In fact, the company has spent in excess of \$1 million deploying a comprehensive, custom-designed network monitoring system that checks network operation on a cell-by-cell basis and reports this monitoring information back to AirCell’s network operations center.

Although this constant monitoring process assists with the company’s effort to ensure compliance with the waiver, the waiver did not mandate this complex system. Rather, AirCell’s diligence and expenditures in this area evidence its sincere desire to be a “good neighbor” to the terrestrial cellular community. These significant monitoring and compliance efforts will provide additional protection to the terrestrial cellular providers if AirCell expands its system pursuant to the Petition.

^{108/} Opposing Carriers’ Comments at 20.

II. OPPOSING CARRIERS PRESENT NO VIABLE EVIDENCE TO REFUTE AIRCELL'S EXHAUSTIVE SHOWING THAT IT WILL NOT CAUSE HARMFUL INTERFERENCE TO EITHER ANALOG OR DIGITAL TERRESTRIAL CELLULAR SERVICE

When AirCell's engineers sat down to review the Opposing Carriers' 500+ page filing in this proceeding, they were astounded by both the nature and sheer quantity of measurement and analytical errors they discovered. Whether these deficiencies resulted from a fundamental misunderstanding of basic RF engineering principles or from a lack of good faith is not readily apparent. What is apparent, however, is that V-Comm's conclusions are fatally flawed and cannot withstand more than the most cursory of inspections. A sampling of the AirCell engineers' discoveries are listed below, with additional discussion provided in the succeeding text and in the detailed and documented AirCell Engineering Review of V-Comm Filings ("Engineering Review"), attached as Exhibit B.

- V-Comm failed to follow the instructions for the Lucent measurement tool it used to measure the cell site operating noise floor. To prevent severely skewed results, the lowest "bins" of data, representing only thermal noise, should have been discarded prior to calculating the relevant co-channel interference.
- The use of the median data point to establish the noise floor (and the corresponding operating point) is not realistic because it would result in unacceptable system co-channel interference for most calls.
- The data set used for the noise floor study was too limited, with only a single AMPS channel being tested at each site, and no TDMA or CDMA tests.
- The Lucent PLM2 measurement tool used by V-Comm is not accurate. AirCell tests of Lucent radios indicated large variations (up to 12 dB) in reported receive signal levels for identical injected inputs.
- Multiple calibration errors (*e.g.*, using only one diversity path, using a single signal source, leaving the antenna connected, injecting the signal at the imprecise -50 dB coupler) further destroyed the credibility of the noise floor data.

- V-Comm’s analysis is based on its own newly-coined term, “Interference Analysis Point” (“IAP”), which V-Comm declares – with virtually no explanation – to be –114 dBm. V-Comm does indicate that this value is based on the results of its Phase 1 and Phase 2 Tests, which AirCell has shown to be critically flawed. Despite its claim to the contrary, the use of the unexplained IAP and its –114 dBm threshold is very much in dispute. 109/
- V-Comm conducted tests – in apparent violation of the Commission’s waiver conditions – with the DPC function disabled. As the Commission has recognized, this will never occur in actual system operation and is therefore irrelevant. Almost all of V-Comm’s analysis is based on this meaningless DPC-off data.
- The “bow tie” pattern flight path is virtually impossible to fly as shown and was crafted such that 59% of the flight occurred outside of AirCell’s designed service area, which was then still in the build-out process. The flight path also required exaggerated aircraft maneuverings near the victim sites that resulted in momentary higher power readings on the ground.
- Cingular refused to enable handoffs, permitting V-Comm to “drag” calls out and induce higher power readings.
- The dynamic power control (“DPC”) settings at the Marlboro service site were improperly changed, permitting higher air-to-ground transmit power to be used. AirCell’s monitoring unit at the site was disabled so that such changes could not be tracked.
- One set of AirCell antennas at the Marlboro site was lowered into the trees, eliminating receive diversity which would require higher transmit power.
- The receive antennas at the victim sites were positioned without the more common downtilt, which would have reduced the level of signals received from the air.
- Two aircraft antenna installations were not inspected by AirCell, and there is no way of knowing whether the installations were correct at the time of the tests.
- AirCell was refused permission to have a Smart Antenna installed at the Marlboro site to demonstrate performance advantages.
- The site selected for V-Comm’s Phase 2 test was atypical, and featured a noise environment that was 17 dB better than the average for the 18 sites in the noise floor study, and had a system operating point whereby 80% of TDMA customer calls were already impaired by terrestrial co-channel interference.

109/ See *Engineering Review* at 2.5-1.

- Lucent's Comments acknowledge the limitation of its equipment to take reliable measurements below -120 dBm, note that the typical system noise floor is -124 dBm, and confirm that terrestrial co-channel interference must be considered in the C/N+I ratio. Lucent omits key information, including whether V-Comm actually followed all of its advice and whether V-Comm properly followed the Lucent manual regarding the processing of measurement data taken with Lucent equipment.
- Notwithstanding all of the mistakes made by V-Comm in measuring AirCell signals on the ground, the worst recorded signals still fall well below the existing levels of terrestrial co-channel interference.

Some of the errors recounted above should come as little surprise to the Commission, as AirCell had predicted a number of these problems based on a review of the Opposing Carriers' test plan filed in the record over three years ago. In a May 9, 2000 *ex parte* letter, AirCell stated that "V-Comm has crafted a plan that appears artificially designed to produce a pre-determined result in the Carrier's continuing efforts to prove that AirCell's low-power units will cause harmful interference to terrestrial cellular service." 110/ Specifically, AirCell commented that:

First, the Test Plan relies upon aircraft flight patterns that are not representative of those typically used during normal operation of the AirCell system or normal aircraft flight. Second, the Test Plan calls for disabling the Dynamic Power Control feature that is a key element of preventing harmful interference from AirCell's airborne units. Third, the Test Plan uses an ambient noise floor for terrestrial cellular service that is wholly unrealistic and which unfairly raises the probability of finding harmful interference from the AirCell devices. 111/

110/ Letter from Ken Jochim, Vice President of Operations, AirCell, Inc., to Magalie Roman Salas, Secretary, Federal Communications Commission, May 9, 2000 at 1.

111/ *Id.* at 2.

In a later letter, AirCell repeated its concerns, reminding the Opposing Carriers that the *AirCell Commission Order* had rejected these same test characteristics – disabled DPC, abnormal flight patterns, and an unrealistically low interference threshold – previously used by the Opposing Carriers. 112/ Unfortunately, the Opposing Carriers and V-Comm chose to repeat their same mistakes, in addition to adding a slew of new ones. These mistakes include a large number of flaws, any one of which might be sufficient to make V-Comm’s results questionable. However, a few of V-Comm’s testing and analytical errors compromise the very foundation of V-Comm’s argument, rendering the totality of its conclusions baseless on their face. The “layering on” of the multitude of errors only increases the magnitude by which V-Comm’s conclusions are discredited.

A. V-Comm’s Overarching False Assumptions And Testing Errors Render Its Data Meaningless

1. V-Comm’s Noise Floor Study Is Fundamentally Flawed, Leading To Grossly Unrealistic Conclusions Regarding Cellular Operating Points

a. V-Comm failed to process data according to Lucent instructions

As the foundational first step in the Opposing Carriers’ interference analysis, it is necessary to establish the minimum level at which their customers’ calls can be received without experiencing degradation from the ambient terrestrial noise and interference (N+I) operating environment at the cell site. The ambient interference

112/ Letter from Ken Jochim, Vice President of Operations, AirCell, Inc., to Magalie Roman Salas, Secretary, Federal Communications Commission, July 20, 2000 at 2-3.

results largely from co-channel and adjacent channel signals from the carrier's own system – *i.e.*, from calls in progress on the same channel using a nearby cell site or from calls being received on an adjacent channel. It is widely understood that, to be carried at a good quality, the received signal of an AMPS call must be approximately 17 dB above the N+I level. 113/ This cellular operating point represents the minimum signal level target for which the carrier designs its system. To the extent AirCell's signals remain 17 dB below this operating point, no harmful interference can be attributed to AirCell. 114/

It is hardly surprising, therefore, that the Opposing Carriers would want to show that the N+I operating environment (often referenced as the “noise floor”) at certain of their sites is so low that the operating point can be set far lower than the levels generally recognized in the industry. 115/ What is perhaps more surprising is both the number and degree of errors – some blatant, others more subtle – they made in attempting to make such a showing.

To calculate its N+I noise floor, V-Comm measured “thermal noise, ambient environmental noise, and co-channel and adjacent channel noise.” 116/ However, after (incorrectly) processing the raw data, what V-Comm reported as the noise floor

113/ This is often referred to as the carrier-to-interference ratio (“C/I”).

114/ This is not to say, however, that harmful interference will necessarily occur if AirCell's signals were to exceed this 17 dB separation threshold.

115/ See, e.g., Theodore S. Rappaport, *Wireless Communications: Principles and Practice* (2d. ed.) (2002) at 63 (providing a range of -90 to -100 dBm for the minimum signal necessary for a good quality call).

116/ See V-Comm Noise Floor Study at 2.

actually consists of thermal noise *only*. The primary reason for this error is not difficult to understand. V-Comm's noise floor data points were taken using a measurement feature, Power Level Management Mode 2 ("PLM2"), built into the Lucent cell site equipment and switch, which logs N+I receive signals when the cell site's radio is not active. When data is collected over a 24-hour period, the resulting histogram (showing the distribution of data) is greatly skewed toward the lower N+I readings (*i.e.*, system noise) because much of the data sampling is taken during the middle of the night, when little or no co-channel interference is present. It is also skewed because the PLM2 only collects data when the site's radio is not active. As a result, the fewest samples are taken during the busiest hours when co-channel interference is greatest. V-Comm took this heavily-skewed histogram and then designated the *median* reading (*i.e.*, the middle data point) as the noise floor.

By relying on all the PLM2 data points taken over a 24-hour period, including those that represent only thermal noise, V-Comm ignores not only common sense, but also the Lucent manual, which clearly recognizes this measurement problem and prescribes a corrective solution:

After the histogram is completed, however, it should be apparent that the counts in the lowest few bins that have non-zero counts represent noise, rather than the interference of interest. The counts in the lowest bins can be thrown out before subsequent processing. The statistics of the remaining counts . . . represent the actual interference" 117/

117/ Lucent Autoplex Manual at 8.

The Lucent manual correctly notes that it is the interference, not the noise component of N+I, that is relevant when discussing cell site operations. 118/

In the Engineering Review, AirCell re-casts the V-Comm data by following Lucent's instructions and deleting the lowest "bins" of data that represent only thermal noise, thereby leaving the relevant co-channel interference. The graphs for the 18 cell sites generated based on this corrected analysis reveal a dramatic unmasking of the terrestrial co-channel interference (*i.e.*, self-interference) levels. The result of this corrected analysis changes the -127 dBm noise floor cited by V-Comm to an average of -106.9 dBm. 119/ The average minimum value of the receive signal level needed to maintain toll quality call ranges from -93.2 dBm in the suburban category to -86.6 dBm in the dense urban category. 120/

118/ As the Engineering Review explains:

Wireless telecommunication systems are generally limited by two influences: thermal noise or interference. When designing a wireless system, be it satellite or terrestrial cellular, one of these limitations will dominate the systems' design. . . . [T]he design and operation of a terrestrial cellular network is not dominated by thermal noise. This means that the equipment vendor and service operator do not spend a great deal of time or money . . . minimizing the thermal noise figure because little would be gained since the overall system is interference limited.

Engineering Review at 2.2-8. Indeed, V-Comm's designation of the relevant operational ratio as "C/I" instead of "C/N+I" implicitly indicates a proper understanding that it is the co-channel interference, not the thermal noise, that limits the design and operation of cellular systems. *See V-Comm Noise Floor Study at 18.*

119/ Engineering Review at 2.4-10.

120/ *Id.*

AirCell confirmed the validity of the re-cast V-Comm data by conducting new N+I measurements at three cell sites, including the same Camden, New Jersey site included in V-Comm's noise floor study. Section 2.2.g of the Engineering Review carefully walks through the processing of this new data, including the important step omitted by V-Comm: comparing the terrestrial operating point with the terrestrially generated N+I.

First, the measurements taken at the Camden site bear a striking resemblance to the re-cast V-Comm data for this site, thereby confirming that the re-cast methodology is valid.^{121/} They also reveal that about 22.7% of the AMPS calls at Camden are operating below the target C/N+I threshold of 17 dB. By not obtaining this 17 dB separation, these are impaired calls. Obviously, AirCell cannot impair already-impaired calls.

Moreover, even if the lowest bins of data (containing only thermal noise measurements) had been properly discarded, the use of the median value would still constitute a separate, obvious error. By declaring the noise floor to be at the middle point of the measured data, this means that half of the measured N+I still remains above the noise floor and severely cuts into the 17 dB isolation required for a toll quality call. To ensure that substantially all of the calls receive the benefit of this 17 dB isolation, V-Comm should have used the highest N+I signals and added the

^{121/} Engineering Review at 2.2-56.

17 dB onto that to determine the point above which terrestrial cellular systems actually operated. 122/

Based on the discussion above, it becomes obvious that the extremely low noise floors and minimum operating points cited by the Opposing Carriers simply cannot be accepted as *typical* network parameters. Using a properly calculated value for *I* in the C/I ratio is important. The Opposing Carriers and V-Comm have repeatedly stated that for a toll-quality call, a reverse channel AMPS signal must have a 17 dB C/I ratio. 123/ If *I* is incorrectly assigned a value that represents only thermal noise, as V-Comm has done, adding 17 dB to this level will not provide adequate isolation from the system's own co-channel interference and calls will be impaired.

There is, however, *one* cell site where these parameters may exist, or at least may have existed during the V-Comm tests. V-Comm based its "AirCell Compatibility" Phase 2 tests on the Ewingville site, which it described as "a typical suburban cell site," "in its normal operating and configured mode, with normal system loading, and actual market interference conditions." 124/ Based on a careful

122/ Assuming *arguendo* that the Opposing Carriers actually do use the median N+I value to design their networks, V-Comm to be consistent should have likewise used a median value from the aircraft signal histogram in its interference analysis, rather using the strongest aircraft signal received on the ground. V-Comm's methodology calls into question the sincerity of the statement that V-Comm's testing was intended to capture "typical" rather than "worst case" scenarios. See Opposing Carriers' Comments at 35.

123/ See, e.g., V-Comm Noise Floor Study at 18.

124/ AirCell Compatibility Test Plan at 17.

analysis of V-Comm's own data, however, it appears that this site is only typical if the carrier typically sets its network operating points such that some 80% of its customers' calls are not "toll quality" (as defined by the Opposing Carriers' stated requirement of a 17 dB C/I ratio to achieve such quality). 125/ If this is, in fact, the case (*i.e.*, that most calls on the network do not enjoy a 17 dB C/I), then there would be little reason to require that AirCell's signals maintain a full 17 dB separation at all times. AirCell cannot "cause" harmful interference where stronger terrestrial co-channel interference already exists.

Even if the operating point at Ewingville were set to ensure a 17 dB C/I for most calls, the operating point would still be much lower than average, because the operating environment (N+I) at Ewingville is much lower than average. In fact, comparing the -123.9 dBm N+I level measured at this site with the average -106.9 dBm N+I level for the 18 sites in the V-Comm Noise Floor Study reveals that the Ewingville site has a 17 dB better AMPS noise environment. 126/ This much quieter noise environment would obviously permit a much lower operating point and likewise would make the site much more sensitive to AirCell's signals. The bottom line is that, whether the reported Ewingville noise environment is naturally occurring or was "adjusted" prior to the V-Comm tests, the site is far from "typical" as V-Comm asserts.

125/ See Engineering Review at 2.4-13.

126/ See Engineering Review at 2.4-11. The N+I levels of the 18 sites represent the V-Comm data recalculated by AirCell in accordance with proper Lucent procedures, as discussed above, to obtain correct N+I values.

Indeed, based on AirCell's testing at the Camden site, the Engineering Review demonstrates that, in order to eliminate self-interference for all calls, the *minimum* reverse channel signal level would have to be -100 dBm. Not surprisingly, this is the same value used by the Commission for "Cmin" – the minimum signal necessary for a good quality call. 127/ The Opposing Carriers have opposed the use of -100 dBm for Cmin, although its use is supported in technical literature and in the record. 128/ AirCell has now confirmed the continuing validity of this value based on current, real-world measurements. 129/

b. Multiple other errors independently render V-Comm's noise floor data invalid

Both the failure to follow the Lucent manual and the use of the median data point as the noise floor are each in their own right sufficient grounds for invalidating V-Comm's conclusions. Lest there be any doubt regarding the illegitimacy of V-Comm's data, however, AirCell has noted a litany of other errors, false assumptions and questionable methodology relating to V-Comm's noise floor study:

- V-Comm only measured a single AMPS channel for only one sector per site to generate the N+I histograms, even though the Lucent PLM2 measurement tool is capable of measuring up to 10 channels at a time. The very limited

127/ *Remand Order* at ¶¶ 13-14.

128/ *Remand Order* at ¶ 14, n.35-37.

129/ The new data also refutes V-Comm's claim that terrestrial calls are carried to just above the thermal noise floor. The Tulsa data, for example, shows that no more than 10% of the calls are received any lower than even -110 dBm. *See* Engineering Review at 2.2-53.

testing data relied upon leaves open the possibility that only the quietest channel or sector was used.

- The Lucent PLM2 measurement tool used by V-Comm is not accurate. AirCell tests of Lucent radios indicated large variations (up to 12 dB) in reported receive signal levels for identical injected inputs. 130/
- The PLM2 mode is designed to offer *relative* performance information versus *absolute* data with the precision required for making a showing of interference in an FCC proceeding. Because all measurements are aggregated into 3.125 dB wide “bins,” the PLM reporting resolution is plus or minus 1.55 dB per bin and all data below -127.7 dBm shows up in a single reporting bin labeled “zero” irrespective of the actual measured level. Notably, Lucent states that “measurements at the ends of the RSSU scale are ambiguous.”131/
- V-Comm did not measure the operating environments for TDMA and CDMA, which involve different frequencies and different co-channel activity. The AMPS operating environment cannot be used as basis for TDMA or CDMA interference analysis. 132/
- V-Comm insisted on using the cell site receiver to take the measurements, as opposed, for example, to more sensitive test equipment. 133/ A cell site receiver has a typical noise figure of 6.4 dB, 134/ meaning that the PLM2 tool used by V-Comm is incapable of discerning whether measurements are noise or interference in the power range of -129.8 dBm (*i.e.*, the kTB noise floor at 26 KHz bandwidth) up to -123.4 dBm. 135/

130/ See *Engineering Review* at 2.2-4.

131/ AT&T (Lucent) manual, “Special Studies Measurements,” at 5. RSSU stands for “Received Signal Strength Unit” and corresponds to 0.78 dB steps. A value of 0 RSSU is -130 dBm.

132/ See *infra* n.154, discussing observed differences in AMPS/TMDA co-channel interference.

133/ See Noise Floor Study at 3.

134/ See *Engineering Review* at 2.2-13 (providing detailed support for this figure).

135/ See *Engineering Review* at Table 2.2.b.1, containing test data showing clearly “that a single [Lucent] receiver, hooked up to two diversity paths, with each path having an identical input signal level, can report widely varying values.” *Engineering Review* at 2.2-7.

- V-Comm only calibrated one diversity path, although both diversity paths were active in the PLM2 study. Because the radio selects the strongest path and reports this value, much of the reported data could be uncalibrated.
- The calibration (of the single diversity path) was performed incorrectly, as the calibration signal was injected at the -50 dB port of the first directional coupler. Directional couplers can have several dB of error at the coupled port. The correct calibration injection point is the input port. This would require disconnecting the antenna, which V-Comm did not do.
- Leaving the sites' antennas connected during the calibration process renders the calibration defective and the data unusable. Co-channel and adjacent channel terrestrially generated interference signals are as high as -98.9 dBm and are combined with the injected calibration signal. When the injected calibration signal is at or below the level of the highest incoming interference, the cell site receiver will report the combined injected calibration signal and incoming interference. Based on this defective calibration, all of the V-Comm data is unreliable.
- V-Comm incorrectly calibrated the receivers using a single signal waveform. Radios report substantially different values in the presence of a typical co-channel interference environment comprised of multiple non-synchronous RF waveforms (*e.g.*, AMPS, TDMA, GSM, CDMA, and other man-made waveforms).

Given the critical measurement errors outlined above, V-Comm's Noise Floor Study and the conclusions based thereon regarding the carriers' terrestrial cellular operating points simply cannot be used for comparison purposes with AirCell aircraft signals to evaluate interference potential. The fact that these conclusions served as the foundational basis for V-Comm's Phase 2 study guaranteed that the Phase 2 study would be wrong from the start.

2. Aircraft Signals Were Measured Incorrectly

The number and severity of errors evident in V-Comm's Noise Floor Study, as detailed above, is rivaled only by the scope of errors and misrepresentations apparent from a review of its flight tests and measurements of AirCell signals on

the ground. V-Comm's "bow tie" flight plan was flawed by a significant number of factors that ensured the results could never be achieved under normal operating and flight conditions. Moreover, there are serious questions relating to all antennas involved in the tests, including the type and placement of the victim antenna, the unverified status of the antennas on the aircraft, and the inability to use AirCell's Smart Antenna System. Finally, V-Comm's analysis relied almost exclusively on tests with AirCell's dynamic power control ("DPC") set at maximum power, which the Commission has previously declared to be irrelevant.

a. Testing outside service boundaries

The most glaring problem with the V-Comm flight test is the fact that 59% of the route occurred outside the typical AirCell service area boundary (80 mile radius around a serving site). This routing guaranteed that the aircraft transmitter would be operating at or near maximum allowed power for a substantial portion of the testing 136/ and especially when the aircraft was near two of the three victim test sites, which were located at the edge of or beyond AirCell's Marlboro site service boundaries in 2001.

V-Comm was aware that AirCell was still in the process of building out its network. Nevertheless, V-Comm indicated that it would not wait to conduct its testing – the results of which the Opposing Carriers proceeded to sit on for nearly two years. The route tested by V-Comm in 2001 is now served by additional sites

136/ Although at least 59% of the route was outside of a normal service area, it is notable that V-Comm reported that the aircraft transmitter operated at full step 3 power only 33% of the time. See Engineering Review at 2.3-3.

that would significantly reduce the power required to carry on a call. In Figure 2.3.c.2, AirCell shows that, if the testing data were limited to that obtained from within the service boundaries, the most common DPC level would drop from step 3 to steps 5 and 6, resulting on average in a 10 dB reduction in received signals from this factor alone. 137/

Exacerbating the flight route's avoidance of AirCell service areas where possible, Cingular refused to enable handoffs between the Ellendale and Marlboro sites. AirCell had specifically requested that such handoffs be enabled. (Such action must be implemented by the carrier in its switch. AirCell has no direct control over this function.) The refusal to enable handoffs – which applies to all calls served by the Marlboro site, not just the V-Comm test calls – prevents a reduction in the aircraft transmitter's power level that would otherwise take place when moving between the two service areas. 138/ Without the handoff capability enabled, V-Comm was able to drag out calls for tens of minutes – very atypical for AirCell calling patterns – and thereby “force” higher DPC readings in the vicinity of two of its victim sites for much longer periods of time. Had V-Comm made more typical, shorter calls, or had handoffs enabled, the new calls could have been established at the other site at a lower transmit power. This methodology

137/ See Engineering Review at 2.3-5,6.

138/ If the Opposing Carriers truly believe that AirCell can cause harmful interference to their networks (although none has ever been reported), it is inexplicable why they would not take actions that would lower AirCell's signals. The same question applies to the refusal to permit the installation of Smart Antennas. See *infra* at Section II.A.5. Opposing Carriers seem more interested in fighting legal battles than actually eliminating the interference they allege exists.

constitutes another example of V-Comm's and the Opposing Carriers' stretching to achieve the worst case results conceivable. 139/

b. Flight patterns were abnormal

The bow tie flight route is a highly unusual route that would not actually occur in normal flight operations, due to the high flight densities in the corridor. Indeed, the FAA refused permission to AirCell to duplicate even one altitude of V-Comm's flight pattern, at any time of day or night. The Commission has previously indicated that flying "abnormal flight patterns" to test for interference can constitute grounds for disregarding the test data. 140/ The same reasoning should apply here. As explained in the Engineering Review:

Aircraft turns in these positions would in some cases force higher gain portions of the aircraft antenna patterns to point toward the victim site, in each case, thereby guaranteeing that the highest signal levels would be seen at the victim sites. . . . 141/

139/ This is not a new "technique" for the Opposing Carriers. In the 1998 Florida tests rejected by the Commission, BellSouth/GTE artificially dragged out calls by imitating Supervisory Audio Tones ("SAT"), preventing the AirCell unit from hanging up once it had lost the signal from its serving site. *See AirCell Commission Order*, 15 FCC Rcd at 9630-31, ¶20.

140/ *AirCell Commission Order*, 15 FCC Rcd at 9630, ¶¶19-20 (upholding the Wireless Telecommunications Bureau's decision to disregard both the July 11 test results and the Florida testing conducted by BellSouth, in part because abnormal circular flight patterns were flown around the victim cell sites).

141/ *See also AirCell Commission Order*, 15 FCC Rcd at 9630, ¶20 (recognizing that, in the 1998 Florida testing cited by the Carriers, abnormal flight patterns around the victim site "put the main lobe of the aircraft antenna pattern into the cell site antenna," thereby resulting in data that "cannot be credited as reflecting the nature or interference potential of the AirCell system as it is designed to operate").

Certainly it can be expected that aircraft can turn at some time . . . [but] these events are transient in nature and should not be taken out of context as continuous signal levels to determine average operating signal levels. Since these turns were conveniently made near victim sites, the data is made to appear that very high signal levels are always present when an AirCell equipped aircraft flies near any victim site. 142/

Beyond being merely “abnormal,” the flight pattern reported by V-Comm would be physically impossible to fly exactly as shown. 143/ The Engineering Review explains that flying the very sharp corners shown on the bow tie pattern:

is physically impossible in an aircraft such as a Lear flying at over 400 knots. The calculated radius for a turn with a 30 degree bank at that speed would be 5 miles . . . (without performing aerobatics, which are defined as bank angles over 45 degrees). . . . Since aircraft do not make abrupt, instantaneous changes in direction, we are left with the question as to what the flight route really was at the turns and corners and what impact that actual route had on the data gathered? Clearly the provided plot does not represent a realizable flight profile. 144/

Another possibility is that the route was actually flown in short segments. As stated in the Engineering Review, “maneuvering of the aircraft for short segment flight pieces could be a possible explanation for the bursts of data in some of the test data reported by V-Comm, that do not follow the normal signal level with distance variations that one would expect” 145/

142/ Engineering Review at 2.3-8.

143/ It is extremely unlikely the FAA would approve the plan exactly as shown in V-Comm’s filing.

144/ Engineering Review at 2.3-9.

145/ Engineering Review at 2.3-7.

3. Non-Reproducible Test Data Was Likely A Result Of Altered And/Or Inappropriate And Atypical Site Configuration Factors

V-Comm's reported data for the Swainton and Marlboro victim sites indicates that the aircraft was transmitting at an unusually high power in relation to its distance from the serving site, resulting in stronger than expected receive signals at the victim sites. ^{146/} AirCell performed an equivalent test flight in Colorado and found that the DPC step changes in the V-Comm tests occurred on average at one-third the distance required to trigger such changes in the Colorado test. There are a few likely causes for this difference:

Altered DPC Parameters. The performance discrepancy could have resulted from improper DPC settings at the Marlboro serving site. Although AirCell personnel had visited the site prior to the testing and determined that the switches were properly set at that time, a mid-test audit revealed that one important parameter in the switch had been changed without AirCell's approval. The change would allow the serving site to direct the aircraft transmitter to transmit at a higher DPC level than otherwise allowed. After the initial verification visit the site provider unilaterally disabled AirCell's Cell Site Test Unit ("CSTU") which could have alerted AirCell to the fact that a change was made. In addition, the site

^{146/} V-Comm also reported unusually high signals at another cite, Oak Hill. That data cannot represent AirCell signals because they defy free space path loss calculations by 15 dB. AirCell has a highly developed link analysis model supported by nearly one million miles of flight testing. AirCell believes the data is likely a result of co-channel interference or very high equipment noise. See Engineering Review at 2.3-10.

provider has also refused to provide to AirCell switch dump readouts that show the site configuration. 147/

Lowered Antenna. The performance discrepancy could have also resulted from improper positioning of the AirCell antennas at the Marlboro site. The site provider or V-Comm moved one set of AirCell sector antennas downward on the Marlboro tower by approximately 15 feet, thus placing the lower antenna set in the trees, and effectively destroying the diversity receive capability for this site. As verified by a recent photo, 148/ it appears that, despite AirCell's request, this antenna placement has still not been corrected.

Victim Site Antennas. Higher reported receive signals at the victim sites could also be attributable to the fact that antennas were not downtilted as is more typical. A non-downtilted antenna can in some cases receive significantly higher energy from an AirCell transmitter. Non-rural sites usually employ downtilted antennas to maximize site utilization efficiency; otherwise, much of the antenna pattern would be "wasted" by pointing skyward instead of on the ground where customers are. In fact, 70% of the non-rural sites selected for V-Comm's noise floor study had downtilted antennas, indicating that the antenna positioning at the chosen victim sites is atypical. The panel-type antennas at these sites were also

147/ See Engineering Review at 2.3-19.

148/ See Engineering Review at 2.3-20; fig. 2.3.b.13.

unusual in that they exhibited wider vertical beamwidths and narrower horizontal beamwidths than normal. 149/

4. Data Resulting From Fixed DPC Tests Are Irrelevant

V-Comm conducted one portion of its Phase I flight tests with the DPC disabled and the power level fixed at the maximum permitted DPC-Step 2. The Opposing Carriers' Comments imply that this testing provides some new, previously unavailable data. 150/ It does not. AirCell, at the request of the Opposing Carriers, conducted flight tests with the DPC disabled in 1997. The Commission correctly refused to consider these results in determining whether AirCell's system is likely to cause harmful interference. The Commission stated that the DPC-disabled testing "eliminated . . . the benefits of one of the main elements of the AirCell design" and "provided no evidence that the AirCell system would cause harmful interference when operating as designed, but only that a major malfunction could lead to interference." 151/ On appeal, the D.C. Circuit upheld the Commission's decision on this point, stating that "the Commission adequately explained why it rejected" DPC-disabled tests results. 152/

149/ See Engineering Review at 2.3-2.

150/ Opposing Carriers' Comments at 35 (citing a "lack of reliable data for analyzing AirCell's interference potential").

151/ *AirCell Commission Order* at 9630, ¶19. As noted earlier, the Commission also rejected the data based on the use of "abnormal" circular flight patterns – the same patterns V-Comm repeated in these more recent tests.

152/ *AT&T Wireless Servs.*, 270 F.3d at 967.

As AirCell's calculations in Table 2.3.c.2 in the Engineering Review illustrate, the DPC-enabled network performance typically would have resulted in 16.8 dB lower signal levels received at the victim site based on this variable alone, versus V-Comm's specially-rigged testing. 153/ In preparation for this filing AirCell also conducted tests comparable to some of the V-Comm DPC-off tests, but with the DPC enabled. The tests were conducted at three different radii and the average difference in the receive signal was 12 dB, not taking into account the fact that, had the AirCell antenna not been lowered below the treeline, approximately another 6.3 dB difference could have been achieved.

In short, there is no valid reason for V-Comm to have presented test results based on the DPC fixed at maximum power, as this is not how the AirCell system operates. Not only are the results irrelevant, but the testing process itself may represent a violation of Cingular's waiver to operate an AirCell sector at their site, assuming no experimental license was obtained for testing purposes. All AirCell partners are required to operate with DPC enabled pursuant to the AirCell waiver conditions. If V-Comm in fact flew at all altitudes and radii with full circles at each altitude, in addition to all of the "bow tie" routes, AirCell estimates that Cingular would likely have been in violation of the waiver conditions for approximately 40 to 50 hours of flight time depending on aircraft speed, wind velocity, and other factors. 154/ Finally, AirCell notes that V-Comm reported no occurrence of actual

153/ See Engineering Review at 2.3-27.

154/ AirCell is not aware of any experimental license they have in this regard, nor that they notified other providers in the vicinity of their intention to do this testing.

interference during this testing, even with the power levels set significantly higher than will occur during normal operations.

5. Other Data Validity Issues

Aircraft Antennas. Contrary to the assertion made by V-Comm, AirCell was not able to verify proper installation of two of the three aircraft antennas used in the flight tests. In the *AirCell Commission Order*, the Commission rejected data resulting from a test where the BellSouth/GTE had improperly installed an AirCell antenna on the test aircraft, resulting in much higher signals being received on the ground. ^{155/} Given this history, the Commission should not rely on any data without documented verification that the aircraft antennas were properly installed at the time of testing, which of course is no longer possible to verify today.

Smart Antenna System. Also contrary to V-Comm's representations, AirCell was first granted, then refused, permission to install a Smart Antenna system at the Marlboro site so that performance comparisons could be made. In 1997 testing, it was shown that the use of a Smart Antenna at the serving site can reduce signals at the victim site by 8-10 dB.

Case Study. In section 2.5 of the Engineering Review, AirCell addresses and debunks V-Comm's "Case Study" that purports to quantify the number of terrestrial calls affected by an AirCell call during an East Coast flight. The Case Study is based upon the same faulty assumptions and fundamentally-flawed data inputs discussed above. In addition, the Case Study relies on V-Comm's own newly-coined

^{155/} *AirCell Commission Order*, 15 FCC Rcd at 9630-31, ¶ 20. Then, as now, AirCell was not given an opportunity to inspect the installation of the antennas.

term, “Interference Analysis Point” (“IAP”), which V-Comm declares – with virtually no explanation – to be –114 dBm. V-Comm does indicate that this value is based on the results of its Phase 1 and Phase 2 Tests which, again, AirCell has shown to be critically flawed. Despite the claim to the contrary, the use of the unexplained IAP and its –114 dBm threshold is very much in dispute. 156/

B. Inaccuracies Underlying V-Comm’s Phase 2 Test Render All Conclusions Meaningless

Like so much of V-Comm’s report, its Phase 2 AirCell Compatibility Test is built upon already corrupt data (*i.e.*, from the flight test, as shown in Section II.A.2.) stacked on top of false assumptions (regarding the noise floor and operating point, *see* Section II.A.1.). Accordingly, in the Engineering Review, AirCell demonstrates that V-Comm’s conclusions regarding the impact of AirCell’s signals on cellular networks are wholly without credibility, as summarized below:

- AMPS. As already discussed section II.A.1.a, the Ewingville site had a noise environment that is a dramatic 17 dB better than the average of the 18 sites selected for the noise floor study. Moreover, unlike the 18 noise floor study sites, V-Comm’s report showed virtually no co-channel signals present at Ewingville. As if this unnaturally low operating environment were not enough to help V-Comm’s argument, the system operating point was set such that 20% of customer calls did not have the benefit of a 17 dB separation above the already rock-bottom noise floor. 157/

156/ *See Engineering Review* at 2.5-1.

157/ The Engineering Review notes that V-Comm configured its drive test not to exceed 1.5 miles from the site, so that a (barely) “good” Mean Opinion Quality Score (“MOS”) could be reported. Had V-Comm driven the full extent of the cell, the average MOS would undoubtedly have fallen below the “good” MOS category. *See Engineering Review* at 2.4-7.

- TDMA. The results for TDMA are similar, although even more startling. Unlike the AMPS data, V-Comm's measurements at the Ewingville site show that the TDMA sector has co-channel signals up to approximately -111.4 dBm. 158/ By superimposing V-Comm's N+I histogram with the received signal strength histogram, it becomes apparent that about 80% of the call signal histogram does not have the required 17 dB separation from the co-channel interference at -111.4 dBm. This value rises to 90% if one applies a 21 dB separation, as Lucent has recommended. 159/ From the call histogram, AirCell could estimate that the target signal level was set around -103 dBm, which is about 13 dB below the -90 dBm recommended as the target value in Lucent documentation. 160/
- CDMA. AirCell was unable to evaluate the CDMA operating point at Ewingville, as V-Comm supplied neither the CDMA noise environment, nor the CDMA operating point information. However, using the TDMA data as an example, it is clear that the presence of random and non-reproducible co-channel interference (at up to -111.4 dBm) would often exceed the simulated AirCell signals, thereby making it impossible to assign variations in call quality metrics solely to the injected AirCell signals. The fact that V-Comm's recorded data is not monotonic in nature also suggests the presence of intermittent noise inputs, as opposed to more steady readings that would be expected from the injected test signal. Given that V-Comm's measurements for the noise floor, baseline call statistics and the various drive tests were not performed simultaneously, it is impossible to match up the simulated AirCell signals with the observed changes in call quality with any confidence.

In short, V-Comm's Phase 2 data is far from the "typical" case V-Comm purports to be studying. In order to reach its conclusions, V-Comm had to rely on an operating point that would result in a substantial proportion of terrestrial calls

158/ See Engineering Review at Fig. 2.4.a.5. Moreover, the fact that there is notable co-channel interference on the measured TDMA channel at Ewingdale compared to very little on the measured AMPS channel destroys V-Comm theory that the AMPS noise floor can be assumed to be the same for TDMA and CDMA.

159/ See Engineering Review at 2.4-14 (citing "Lucent Autoplex Telecommunications Systems System 1000, TDMA and DCCH, Implementation Guidelines," 401-200-112, August 1996).

160/ See Engineering Review at 2.4-16 (citing Lucent Technologies, "TDMA Default and Recommended Translations Parameters for Generic 18.0").

being impaired even without the presence of any AirCell signals. As discussed in section II.A.1.a., AirCell's subsequent testing of a site in V-Comm's test area revealed vastly different results in operating point and co-channel interference. In addition, the inadequate supporting data provided by V-Comm makes confirmation of its findings impossible.

C. New Testing Confirms That AirCell Will Not Cause Harmful Interference, Consistent With Results From AirCell's 1997 Analog Tests And The More Recent Digital Tests

1. Independent Tests Confirm AirCell's 1997 Analog Test Results

AirCell has flown nearly a million miles of flight tests comprising thousands of hours of data collection. AirCell tests every new cell added to its network as part of the site's turn-on process and regularly flight-tests segments of its network using both piston and jet powered aircraft 161/ at a variety of altitudes. All of the results of AirCell's ongoing testing has been consistent with the results of the 1997 analog tests, which demonstrated that AirCell does not cause harmful interference.

Because V-Comm continues to question the 1997 tests, AirCell submits into the record the results of additional, independently designed and managed testing conducted in 1998 as part of a service provider's due diligence investigation of the AirCell system. 162/ After witnessing the testing and viewing the results, the service provider became, and remains today, a partner carrier in the AirCell system.

161/ Although V-Comm makes an issue of the fact that no jet aircraft were used in the 1997 testing, the aircraft's engine has no relevance in determining the potential for interference.

162/ See Engineering Review at §2.6.

The independent testing was conducted using a true worst case scenario. ^{163/} Significantly, the flight path was an abnormal, semi-circular path flown around the victim site, thereby addressing V-Comm's concern regarding orientation of the aircraft in relation to the victim and serving sites. ^{164/} The semi-circular flight path, although unlikely to occur in actual practice, provides a variety of different orientations, including oblique angles, perpendicular angles and parallel angles to both the AirCell serving cell and the terrestrial victim cell. ^{165/} Based on the data gained from this testing at a worst case rural quiet site, AirCell was able to calculate that a ground caller may expect to experience an AirCell-induced two second fade on the average of once every 111.1 hours. This finding is consistent with AirCell's 1997 data and represents far less impairment than what callers already endure from the terrestrial system's own co-channel interference. More importantly, this clearly does not rise to the level of "seriously degrad[ing], obstruct[ing], or repeatedly interrupt[ing] a radiocommunication service" and therefore does not constitute harmful interference, confirming the AirCell and the Commission determinations based on the 1997 tests.

The validity of the 1997 tests was also validated by a recent 2003 flight test, which was similar to a 1997 test except that a different aircraft antenna was used.

^{163/} See Engineering Review at 2.6__.

^{164/} See Opposing Carriers' Comments at 24-25 (complaining that flying directly toward and over a victim site was a "best case" scenario).

^{165/} At least at one point in the arc, the aircraft is broadside to the victim site with the serving site directly ahead, which V-Comm described as being a worst case scenario. See *id.*

The recorded received signal levels from the two tests are overlaid in Figure 2.6.b.0 in the Engineering Review. The close similarity in the data patterns indicates that aircraft antenna type does not affect the measured signal levels to any significant degree and, more importantly, that the AirCell network still performs at the same levels measured in 1997. 166/

2. Recent Digital Testing Confirms WSE's 2002 TDMA And CDMA Test Conclusions

In section 2.6 of the Engineering Review, AirCell responds to V-Comm's criticisms of the digital testing conducted by WSE and submitted with the Petition. In addition to explaining why V-Comm's criticisms are unfounded, AirCell re-confirms its earlier conclusions with new data obtained from test flights conducted in the Northeast and in Colorado in April and May 2003.

Like most of the V-Comm report, much of V-Comm's critique of the WSE digital testing relies on arguments relating to use of the proper noise floor (in spite of the fact it never actually measured any digital noise floors). The fallacies underlying V-Comm's noise floor analysis are discussed exhaustively in sections 2.2, 2.5 and 2.6 of the Engineering Review (and Section II.A.1., *supra*) and will not be repeated here. Responses to V-Comm's major allegations are summarized below:

- *The WSE tests were conducted in a "laboratory environment" not representative of true operating conditions.* Unlike V-Comm's approach, WSE's test used a proper scientific method of closing the system to environmental variables that could not be controlled. This permitted true cause and effect measurements of the AirCell signal without contamination by outside co-channel signals, which occurred in the V-Comm tests.

166/ See Engineering Review at 2.6-3.

- *The WSE tests did not consider numerous effects that could influence the results, such as the use of diversity receive, RAKE receiver, reverse power control and soft handoffs.* In each instance, the “missing element” cited by V-Comm would only serve to improve the terrestrial cellular call performance in the face of interference. In the case of diversity receive, the terrestrial receiver will choose the signal path to the antenna providing the best signal, ensuring that the best case condition exists in the face of AMPS co-channel interference. Similarly, RAKE receivers make the terrestrial call more immune to co-channel interference, and therefore were not used in order to render the test results more conservative. Soft handoffs likewise improve the interference threshold of a subscriber call in between two cells or sectors. Moreover, soft handoffs were not tested because it is extremely unlikely that an aircraft signal could cause interference to two sectors simultaneously. Finally, reverse power control was in fact employed where appropriate.
- *WSE did not consider the effects of AirCell interference on digital control channels.* There was no reason to separately consider the effects on control channels, as control channels are more robust than voice channels. In CDMA, the reverse control channel has a 3 dB advantage over full rate voice. Both TDMA and CDMA control channels gain an advantage by employing a re-try process when there is a failure in the receipt of a control channel packet.
- *WSE did not test for the effects on establishing new calls.* In fact, it is obvious from reading WSE’s description of the testing process that the simulated AirCell signals were initiated prior to establishing a call. The test results therefore show that AirCell signals will not prevent the establishment of terrestrial calls.
- *Subscribers being served at maximum power cannot take advantage of power control to mitigate interference.* Where a subscriber is transmitting at maximum power, and is experiencing marginal performance, two characteristics of co-channel interference should be recognized. First, the interference occurs as a transient, rather than steady state signal. An occasional occurrence can be counteracted by the normal interference control mechanism. More importantly, incident AirCell signals are at very low levels, far below the noise plus interference of terrestrial cells. Even subscribers with calls being carried at the most adverse link conditions are unlikely in the extreme to experience interference from an AirCell call.
- *WSE did not consider that for CDMA systems, higher mobile transmit power at the test site would result in increased interference at neighboring sites.* V-Comm implies that reverse channel interference would result in cascading reverse channel power control runaway. Very early CDMA systems *did* sometimes 'crash', dropping all calls on a sector or cell when traffic loading exceeded a certain point. This scenario was fixed long ago by aggressively

limiting this positive feedback, and accepting incremental changes in error rate under high system-generated noise conditions to optimize call quality for *all* callers as a group. More importantly, a narrowband interferer, which doesn't respond to power control as a part of the CDMA system, can't participate in such a power runaway. Of course, given the terrestrial operating points identified based on the Camden test data discussed in section 2.2.g of the Engineering Review, AirCell's signals are in any event too low to affect the CDMA noise floor. Also, V-Comm failed to correctly understand and represent the impact of spreading on a narrowband interferer within a spread spectrum CDMA channel.

- *WSE failed to consider AirCell's potential impact on other digital technologies.* Although V-Comm criticizes WSE for "omitting" tests of newer digital technologies, there are no corresponding tests performed by V-Comm.^{167/} V-Comm claims that newer technologies are more susceptible to interference without offering any sound technical reasoning based on air interface details. V-Comm also offers that cellular carriers will be moving to tighter reuse schemes. This will necessarily increase the amount of noise plus interference in the terrestrial network. Thus, any new technology implementation must also include mechanisms to manage interference. To do less would be to follow a path of decreasing quality for the end user.

V-Comm also expressly criticizes the lack of GSM testing. However, GSM networks are frequency hopping systems, and provide considerably more immunity to in-band interference when compared to IS-136 TDMA. In short, GSM/GPRS networks are more robust in the presence of terrestrial co-channel interference than TDMA networks.

D. Lucent's Comments Are Unconvincing In Their Support For V-Comm's Testing, And Do Not Address Key Issues

AirCell reviewed the comments submitted by Lucent, apparently filed in an attempt to lend credibility to V-Comm's testing. The Opposing Carriers undoubtedly represent major customers for Lucent (which sells wireless switching

^{167/} This is particularly surprising in light of the fact that V-Comm took an additional 13 months to complete its tests and report. During the 13 months that it had the results of the WSE testing in hand, newer technologies had been deployed by that time, and V-Comm had the sponsorship of the three largest wireless carriers, representing all digital technologies available.

equipment), so one would not expect its comments to openly undercut the arguments made by the Opposing Carriers. Nevertheless, the carefully-worded comments are hardly a ringing endorsement for V-Comm's testing and, when read carefully, actually support AirCell/WSE's analysis on a number of points. While the Engineering Review provides a full analysis of the Lucent Comments, a number of AirCell's findings are highlighted below:

- Some of Lucent's comments simply state what Lucent advised V-Comm to do, without stating whether V-Comm followed the advice. For example, the Engineering Review points to advisory statements in Lucent's section 3.2 that suggest Lucent recognized V-Comm's errors resulting from insufficient sampling. Lucent does not comment regarding V-Comm's compliance with its guidance.
- In describing the tests, Lucent acknowledges the limitation of its equipment, admitting that "some equipment did not measure readings below -120 dBm. It is likely that these reading [sic] indicate interference levels below -120 dBm." Based on this statement, V-Comm has no legitimate basis for reporting noise floor measurements in the -120 to -130 dBm range. 168/
- Lucent specifically notes that "[t]ypically, the specified (warranted) noise floor is -124 dBm/30kHz."169/ V-Comm ignores this guidance and presents data extrapolated beyond the valid linear capability of the test equipment. 170/ V-Comm then attempts to pass off this data as "typical" in spite of Lucent's explicit comment about what is actually "typical."
- AirCell agrees with Lucent that the total interference to consider in the C/N+I ratio is comprised of the receiver noise and co-channel interference.171/ As discussed *supra* in Section II.A.1, V-Comm fails to follow this guidance and instead uses receiver noise only to represent total interference.

168/ See Engineering Review at 3.2-2 (citing Lucent Comments at n.5).

169/ See *Id.* at 3.2-2 (citing Lucent Comments at §4.2).

170/ See *Id.*.

171/ See *Id.* at 3.2-2 (citing Lucent Comments at §4.3).

- As explained in Section II.A.1.a. *supra*, V-Comm does not follow the Lucent documentation in processing the noise floor data taken using the PLM2 tool. The fact that Lucent chose to remain silent on this issue is a glaring omission that calls into question the credibility and thoroughness of Lucent's Comments
- Lucent's statement that signals at -117 to -114 dBm caused degradation in the blocked call rate is meaningless without noting the received signal level of the calls being blocked. 172/
- Lucent states that an external noise power of -109 dBm would result in a 30% cell coverage reduction, but misleadingly omits the very important point that this is only true when the source of interference is spread across the whole 1.25 MHz bandwidth CDMA channel. This calculation does not apply to narrowband, 30 kHz interferers which, at -109 dBm would only be equivalent to a 1.25 MHz carrier at -125.2 dBm. 173/

The Lucent Comments, for which no authors are listed, were obviously written to lend support to V-Comm testing. Despite this apparent mission, the comments actually provide information that acts to reinforce AirCell's arguments. Nevertheless, the presence of notable omissions and a number of outright inaccuracies do more to injure Lucent's own credibility rather than bolster that of V-Comm.

E. Opposing Carriers Express Little Interest In Addressing Actual Source Of Interference

Given the substantial financial, legal and technical resources the Opposing Carriers have brought to bear over the years against AirCell's nascent and non-interfering service, it is surprising how little they have done to combat actual,

172/ See *Id.* at 3.2-2 (citing Lucent Comments at §4.4).

173/ See *Id.* at 3.2-4 (citing Lucent Comments at §4.7).

significant on-going interference that results from the common but illegal use of standard cellular phones aboard aircraft. A study commissioned by AirCell (attached as Attachment B to the Engineering Review) indicates that a single airborne call will adversely affect an average of 3.95 customers. Yet, despite this occurrence during virtually every hour of every day, the Opposing Carriers have not addressed this issue through consumer education, through advocating regulatory enforcement, or by optimizing terrestrial antenna patterns to reduce signals from illegally calling aircraft. Indeed, the Opposing Carriers' own customer service representatives have indicated that calls may be placed while in-flight. The Opposing Carriers' obsession with AirCell, while ignoring the *real* airborne-based interference, calls their credibility and motives into question.

F. Opposing Carriers Have Chosen To Challenge The Remand Order In Court; Repetition Of The Same Arguments Here Is Not Proper

In the Opposing Carriers' Comments, the Opposing Carriers proffer arguments in opposition to the Commission's decision in its *Order on Remand*. ^{174/} This proceeding regarding the proposed extension and expansion of the waiver is an improper venue for re-arguing these issues, especially given the fact that the Opposing Carriers have already chosen to challenge this order by filing a Petition for Review in the D.C. Circuit. ^{175/} Their request to obtain what amounts to a backdoor petition for reconsideration should not be entertained. Had the Opposing

^{174/} See Opposing Carriers' Comments at 69-71.

^{175/} *AT&T Wireless Servs. v. FCC*, No. 03-1043 (D.C. Cir.).

Carriers wished the Commission to consider their arguments, they could have filed a petition for reconsideration of the *Order on Remand* within the statutorily-designated timeframe. ^{176/} Now, however, it would be improper for the Commission to address these issues that are currently pending before the court. ^{177/}

It is beyond dispute that the Commission may rely on its own prior decisions as establishing legal precedent. Incredibly, the Opposing Carriers' Comments suggest that even if the court upholds the Commission's *Order on Remand*, the Commission nevertheless may not rely on its findings in that order. ^{178/} To the contrary, the Commission should feel particularly confident about relying on its *AirCell Commission Order*, given that the actual operation of the AirCell system has not caused any harmful interference. Moreover, the *Order on Remand* merely provides additional explanation on one aspect of the agency's original conclusion. Thus, the Opposing Carriers' concern that the original record was based on very limited data is addressed by the fact that there has now been "enough operational experience to judge the technical characteristics of this system." ^{179/} Of course, this is not to say that the Commission may not consider new evidence of harmful interference caused by the AirCell system. Yet, not even the Opposing Carriers

^{176/} See 47 U.S.C. § 405 (providing a 30-day deadline for filing petitions for reconsideration).

^{177/} See e.g., *Greater Boston Television Corp. v. FCC*, 463 F.2d 268, 283 (1971).

^{178/} See Opposing Carriers' Comments at 70-71.

^{179/} *AirCell Commission Order*, 15 FCC Rcd at 9646, ¶46.

have been able to point to a single complaint of harmful interference attributable to AirCell's operations.

The Opposing Carriers also suggest that the Commission should not rely on RF engineering principles and industry norms so widely accepted that they appear in textbooks, manufacturers' documentation and carriers' internal design guidelines. 180/ Rather, the Opposing Carriers would have the Commission base its decisions on improperly conducted unscientific measurements, taken in an uncontrolled environment susceptible to extraneous external signals using an unrepresentative site. As explained in detail in the Engineering Review, the Commission should reject these measurements for the same reasons it rejected the Opposing Carriers' data in the *AirCell Commission Order*, 181/ making it clear that the use of faulty measurement techniques and unrealistic, abnormal operating assumptions will not be sanctioned.

180/ See Opposing Carriers' Comments at 69-70.

181/ See *AirCell Commission Order*, 15 FCC Rcd at 9630-31, ¶¶ 19-20.

III. CONCLUSION

In light of AirCell's resounding justification of its request for extension of the period and scope of the waiver, and the fact that Opposing Carriers present no valid evidence to refute AirCell's exhaustive showing that it will not cause harmful interference to either analog or digital terrestrial cellular service, we urge the Commission to grant the Petition by extending the period and scope of the waiver.

Respectfully submitted,

AIRCELL, INC.

By: *Michele C. Farquhar*

Michele C. Farquhar
Angela E. Giancarlo
David L. Martin
HOGAN & HARTSON, L.L.P.
555 Thirteenth Street, N.W.
Washington, D.C. 20004-1109
Tel: 202-637-5600
Fax: 202-637-5910

Attorneys for AirCell, Inc.

June 9, 2003

Exhibit A: AirCell Cellular Licensee Partners as of June 9, 2003

ALLTEL Corporation
California RSA No. 3 Limited Partnership d/b/a Golden State Cellular
CC Communications
Cellular Network Partnership, A Limited Partnership d/b/a Pioneer Cellular
Centennial Communications Corporation
CenturyTel Wireless, Inc.
Comcast Cellular Communications, Inc.
Commnet of Delaware L.L.C.
Commnet Wireless, Inc.
Corr Wireless Communications, L.L.C.
ETEX Communications, L.P.
Kentucky RSA 4 Cellular General Partnership
Northeast Communications of Wisconsin, Inc. d/b/a Cellcom
Pine Belt Cellular, Inc. d/b/a Pine Belt Wireless
Rural Cellular Corporation
Smith Bagley, Inc.
Southern Illinois RSA Partnership d/b/a First Cellular of Southern Illinois
South Canaan Cellular Communications Company
Tennessee RSA No. 3 Limited Partnership d/b/a eloqui Wireless
Texas RSA 1 Limited Partnership d/b/a XIT Cellular
Texas RSA 8 South Limited Partnership d/b/a Wes-Tex Cellular
United States Cellular Corporation
Vanguard Cellular Financial Corp.
Western Wireless Corporation
Yorkville Communications, Inc.